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Final Environmental Impact Statement

Volume I

Sierra National Forest Motorized Travel Management



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Travel Management EIS

Final Environmental Impact Statement

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Abstract: This Final Environmental Impact Statement (FEIS) describes the environmental effects of the proposal by the Sierra National Forest (SNF) to: 1. Prohibit motor vehicle travel off designated National Forest Transportation System (NFTS) facilities (roads, motorized trails and areas) by the public except as allowed by permit or other authorization (this prohibition would not apply to snowmobiles). 2. Add unauthorized routes and areas (with seasonal restrictions) to the current system of NFTS facilities. 3. Change allowable vehicle class, season of use and year-round closures on NFTS facilities. And 4. Make two non-significant Land and Resource Management Plan (LRMP) amendments to A) Standard and Guide (S&G) #22: make a change to adjust acres in ROS classes on the ROS element map and B) make a change to S&G #17 to close maintenance level 1 roads to motor vehicle use. These actions are needed in order to implement the 2005 Travel Management Rule (36 CFR Part 212) while providing for a diversity of motor vehicle recreation opportunities and providing motorized access to dispersed recreation opportunities on the SNF. The FEIS discloses environmental impacts associated with five alternatives: the no action alternative (Alternative 1), would continue travel management under the current plan; the proposed action (Alternative 2), is the Agency's original proposal for travel management; Alternatives 3, 4 and 5 respond to issues raised by the public during the comment period on the DEIS. Maps of each alternative can be found in Appendix K.

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SUMMARY OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS)

PROPOSED ACTION

In the Notice of Intent (NOI) published September 11, 2007 (Volume 72, Number 175), the Sierra National Forest (SNF) proposes the following actions:

1. Prohibition of motor vehicle travel off designated National Forest Transportation System (NFTS) facilities by the public except as allowed by permit or other authorization (this prohibition would not apply to snowmobiles).
2. Addition of 40 miles of unauthorized routes (with proposed seasons of use) as NFTS trails, 6 miles as NFTS roads, and addition of one area, totaling 6 acres, to the NFTS.
3. Change the vehicle class and/or season of use on approximately 753 miles of NFTS roads, and close approximately 204 miles of NFTS roads (unless allowed by permit or other authorization) to public use year-round.

During the NEPA process the proposed action has evolved and the current proposed action is now described in Chapter 2 as Alternative 2.

SIGNIFICANT ISSUES

Internal and external scoping identified the following significant issues and these issues were used to develop the action alternatives. The significant issues are listed in Table S- 1 below.

Table S- 1. List of Significant Issues

Issue Topic	Concern
1. Impacts to Motorized Access	There is concern that the proposed action does not provide adequate motorized access to routes and other recreational areas and would not provide a sufficient variety of types of motorized recreational experiences. Public comments indicate that motorized access would be closed to areas including dispersed campsites, vistas, picnic areas, off-highway vehicle (OHV) staging and off-loading areas, equestrian parking areas, hang gliding, fishing and rock climbing areas which have been enjoyed by the public for many years. It is perceived that the proposed action does not provide enough opportunities specifically for motorcycles and all terrain vehicles (ATVs) or for loops and technical areas (hill climbs, rock crawling, etc.) and this diminishes the variety of motorized recreational experiences the public desires. Some commenters have historic ties to certain locations that would be closed in the proposed action. Some people also voiced concerns that access from their private property onto motorized routes on National Forest System (NFS) lands would be closed, which they feel would affect their enjoyment of their property.
2. Motorized Use and Ownership Conflicts	There is concern that the number of miles of routes open under the proposed action, as well as the location of some of those routes, would result in conflicts between motorized and non-motorized users and conflicts between different types of motorized users (4X4, ATV, motorcycle). Some members of the public believe that concentrating motorized use on designated routes and areas would cause overcrowding of those areas and this would increase conflicts, leading to an overall degradation of the recreational experience. Some comments indicated that there would be conflicts with private property owners once the use of certain routes near private property increases due to this concentration of users.

Issue Topic	Concern
3. Impacts to Natural and Cultural Resources	There is concern that the proposed action would result in increased impacts to natural and cultural resources. Edge effects, soil erosion, spread of noxious weeds and crushing of native plants were mentioned as impacts to vegetation. Fragmentation and noise disturbance were cited as impacts to wildlife habitat. Loss of groundcover, soil erosion and sedimentation into streams, especially related to trails crossing streams, were noted to impact water quality and aquatic habitat. Some concerns were expressed for motorized use in specific areas with cultural resource values. Concern was also articulated over impacts to air quality resulting from the operation of ATVs and motorcycles.
4. Impacts to Non-motorized recreational experiences	There is concern that the motorized access allowed in the proposed action would impact both the availability of opportunities and the quality of non-motorized recreation. This was particularly important to hikers, hunters and anglers. Everyone who expressed this concern mentioned the impacts of vehicle noise and trail dust on their experience. Hunters and anglers noted that easy access increases the pressure on fish and wildlife. This can reduce hunting and fishing success and/or the size of the animals present. Anglers were concerned that motorized access into certain areas could result in trail erosion and sedimentation of prime angler streams, reducing the viability of the populations found there.

ALTERNATIVES CONSIDERED IN DETAIL

The SNF developed five alternatives: the no action (Alternative 1), the proposed action (Alternative 2) and three other action alternatives (Alternatives 3, 4 and 5) generated in response to the significant issues listed in Table S- 1. The five alternatives considered in detail for this analysis are listed in Table S- 2. Complete details of the alternatives, including project mitigation measures, are found in Chapter 2 (Alternatives) of this document.

Table S- 2. List of Alternatives Considered in Detail

<p>Alternative 1: No Action Alternative</p>	<p>The no action alternative provides a baseline for comparison. Under the no action alternative, current management consists of managing off-highway use as determined by the Forest Supervisor in April 1977 (Environmental Analysis Report of the Impact of Off-Road Vehicle Use on the SNF). This decision was implemented by Forest Order 15-77-3. The plan identified areas where motorized travel was prohibited or motorized travel was restricted to designated routes. These areas are depicted in Figure 1- 3. Areas Where Motorized Cross-country Travel is Currently Prohibited. In this alternative, 605,000 acres of National Forest System lands would remain open to motorized cross-country use. The NFTS of roads is defined under the SNF 1998 Road Closure Plan and implemented by Forest Order R5-83-3.</p> <p>The Travel Management Rule would not be implemented and no motor vehicle use map (MVUM) would be produced. Motor vehicle travel by the public would not be limited to designated routes, except within areas described in Figure 1- 3. Areas Where Motorized Cross-country Travel is Currently Prohibited. Unauthorized routes would continue to have no status or authorization as NFTS facilities.</p> <p>Actions (See Tables 2-1 and 2-2 for details):</p> <ol style="list-style-type: none"> 1) Continues prohibition of motorized cross-country travel where motorized travel was prohibited or restricted to designated facilities, and allows motorized cross-country travel in areas on the SNF outside those where motorized travel was prohibited or restricted to designated facilities 2) Adds no new NFTS facilities 3) Makes no changes to the NFTS 4) Makes no amendments to the LRMP
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<p>Alternative 2: Proposed Action</p>	<p>The proposed action was developed based on Agency knowledge (including route inventory) and public input regarding popular routes for motorized recreation and is comprised of the prohibition of motorized cross-country travel, proposed additions to the NFTS, proposed changes to the NFTS as described in the Notice of Intent (NOI) published in the Federal Register September 11, 2007 (Volume 72, Number 175) with some modifications. Alternative 2 also proposes two non-significant LRMP amendments. Alternative 2 meets the objective of prohibiting cross-country travel.</p> <p>Actions (See Tables 2-3 and 2-4 for details):</p> <ol style="list-style-type: none"> 1) Prohibits motorized cross-country travel 2) Adds: <ol style="list-style-type: none"> a. NFTS motorized trails b. NFTS roads c. Areas open to motor vehicle use 3) Changes to NFTS <ol style="list-style-type: none"> a. Change vehicle class on NFTS roads b. Changes the season of use on NFTS roads and NFTS trails c. Changes NFTS roads from seasonally open to closed year-round and from closed year-round to seasonally open d. Changes operational maintenance level on NFTS roads and trails 4) Makes two non-significant LRMP amendments to: <ol style="list-style-type: none"> a. S&G # 22 the Recreation- ROS Element Map: Removes 512 acres from Semi-Primitive Non-motorized ROS Class. Adds 512 acres to Semi-Primitive Motorized ROS Class b. S&G # 17 Recreation- OHV: would change to: "... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions. . "
<p>Alternative 3</p>	<p>Alternative 3 responds to issues of impacts to natural and cultural resources and impacts to non-motorized recreational experience by prohibiting motorized cross-country travel and does not add any facilities to the NFTS. This alternative also provides a baseline for comparing the impacts of other alternatives that propose changes to the NFTS.</p> <p>Actions (See Table 2-5 for details):</p> <ol style="list-style-type: none"> 1) Prohibits motorized cross-country travel 2) Adds no new NFTS facilities 3) Makes no changes to vehicle class or seasonal use restrictions on the NFTS 4) Makes no amendments to the LRMP

<p>Alternative 4</p>	<p>Alternative 4 responds to issues of impacts to natural and cultural resources and impacts to non-motorized recreational experience by prohibiting motorized cross-country travel, adding facilities in locations that avoid or mitigate for sensitive resources, and making changes to the NFTS.</p> <p>Actions (See Table 2-6 and 2-7 for details):</p> <ol style="list-style-type: none"> 1) Prohibits motorized cross-country travel 2) Adds: <ol style="list-style-type: none"> a. NFTS motorized trails b. NFTS roads c. Areas open to motor vehicle use 3) Changes to the NFTS <ol style="list-style-type: none"> a. Change vehicle class on NFTS roads b. Change the season of use on NFTS roads of NFTS trails c. Changes NFTS roads from seasonally open to closed year-round and from closed year-round to seasonally open d. Changes to operational maintenance level on NFTS roads and trails 4) Makes two non-significant LRMP amendments to: <ol style="list-style-type: none"> a. S&G # 22 the Recreation- ROS Element Map: Removes 1,074 acres from Semi-Primitive Non-motorized ROS Class. Adds 1,074 acres to Semi-Primitive Motorized ROS Class. b. S&G # 17 Recreation- OHV: would change to: <i>S&G # 17 Recreation- OHV: "... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions. . "</i>
<p>Alternative 5</p>	<p>Alternative 5 responds to issues of impacts to motorized access and motorized use and ownership conflicts. This alternative prohibits cross-country travel, adds facilities to the NFTS, and makes changes to the NFTS to provide motor vehicle access and motorized recreation opportunity.</p> <p>Actions (See Tables 2-8 and 2-9 for details):</p> <ol style="list-style-type: none"> 1) Prohibits motorized cross-country travel 2) Adds: <ol style="list-style-type: none"> a. NFTS motorized trails b. NFTS roads c. Areas open to motor vehicle use 3) Changes to the NFTS <ol style="list-style-type: none"> a. Change vehicle class on NFTS roads b. Change the season of use on NFTS roads and trails c. Change NFTS roads from seasonally open to closed year-round and change from closed year-round to seasonally open d. Changes to operational maintenance level on of NFTS roads and trails 4) Makes two non-significant LRMP amendments to: <ol style="list-style-type: none"> a. S&G # 22 the Recreation- ROS Element Map: Removes 1,074 acres from Semi-Primitive Non-motorized ROS Class. Adds 1,074 acres to Semi-Primitive Motorized ROS Class. b. S&G # 17 Recreation- OHV: would change to: <i>"... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions. . "</i>

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

For a summary of environmental impacts refer to Table 2-12 Summary Direct and Indirect Effects of the Alternatives on Forest Resources located on page 2-41.

CHAPTER 1 – PURPOSE AND NEED

1.1 Document Structure

The Forest Service (Agency) has prepared this Final Environmental Impact Statement (FEIS) in compliance with the 1969 National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This FEIS discloses the direct, indirect and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters and appendices:

Chapter 1. Purpose and Need for Action: This chapter briefly describes the proposed action, the need for that action and other purposes to be achieved by the proposal. This section also details how the Forest Service informed the public of the proposed action and how the public responded.

Chapter 2. Alternatives, including the Proposed Action: This chapter provides a detailed description of the Agency’s proposed action as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table comparing the proposed action and alternatives with respect to their environmental impacts.

Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the environmental impacts of the proposed action and alternatives.

Chapter 4. Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.

Chapter 5. Index

Appendices: The appendices provide more detailed information to support the analyses presented in the environmental impact statement.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project record located at Sierra National Forest Headquarters, 1600 Tollhouse Road, Clovis CA.

1.2 Background

Over the past few decades, the availability and capability of motor vehicles, particularly off-highway vehicles (OHVs) and sport utility vehicles (SUVs) has increased tremendously. Nationally, the number of OHV users has climbed sevenfold in the past 30 years, from approximately 5 million in 1972 to 36 million in 2000. California is experiencing the highest level of OHV use of any state in the nation. There were 786,914 all terrain vehicles (ATVs) and OHV motorcycles registered in 2004, up 330 percent since 1980. Recent trends of annual sales of ATVs and OHV motorcycles in California were the highest in the United States. From 1989 to 2002 four-wheel drive vehicle sales in California increased by 1500 percent to 3,046,866.

Unmanaged OHV use has resulted in unplanned roads and trails, erosion, watershed and habitat degradation and impacts to cultural resource sites. Compaction and erosion are the primary effects of OHV use on soils. Riparian areas and aquatic dependent species are particularly vulnerable to OHV use. Unmanaged recreation, including impacts from OHVs, is described in the document “Four Key Threats Facing the Nation’s Forests and Grasslands (USDA-FS June 2004).”

On August 11, 2003, the Pacific Southwest Region of the Forest Service entered into a Memorandum of Intent (MOI) with the California Off-Highway Motor Vehicle Recreation Commission and the Off-Highway Motor Vehicle Recreation Division of the California Department of Parks and Recreation. That MOI set in motion a region-wide effort to “designate OHV roads, trails and any specifically defined open areas for motor vehicles on maps of the 18 National Forests in California by 2007.”

On November 9, 2005, the Forest Service published final travel management regulations in the Federal Register (FR Vol. 70, No. 216-Nov. 9, 2005, pp 68264-68291). This final Travel Management Rule requires designation of those facilities that are open to motor vehicle use on National Forests. Only facilities that are part of a NFTS may be designated for motorized use. Designations are made by class of vehicle and, if appropriate, by time of year. The final rule prohibits the use of motor vehicles off designated NFTS roads, NFTS trails and areas, as well as use of motor vehicles on roads and trails that are not specifically designated for public use.

On some National Forest System (NFS) lands, long managed as open to cross-country motor vehicle travel, repeated use has resulted in unplanned, unauthorized, roads and trails. Motorized routes created through open use are defined as unauthorized routes per the Travel Management Rule 36 CFR 212. These routes developed without environmental analysis or public involvement and do not have the same status as NFTS roads and NFTS trails included in the NFTS. Nevertheless, some unauthorized routes are well-sited, provide excellent opportunities for outdoor recreation by motorized and non-motorized users and would enhance the NFTS. Other unauthorized routes are poorly located and cause unacceptable impacts. In order for an unauthorized route to be designated, it must first be added to the NFTS.

In 2002, the SNF began examining known previous records (maintenance plans, maintenance expenditures, existing road and trail atlases, forest maps, etc.) that were in effect as of January 12, 2001 (FSM 7711.2) to capture the entire NFTS and transferred the necessary information into the Infrastructure database (INFRA) and verified the Forest Transportation Atlas. The Forest Transportation Atlas and INFRA database account for NFTS roads and trails (including all associated trailheads, parking lots, staging areas and turnouts including parking within one vehicle length from the edge of roads or trails, unless otherwise prohibited). The Forest Transportation Atlas identifies the NFTS and the management objectives for each transportation facility.

1.2.1 Travel Management on the SNF

Land and Resource Management Plan (LRMP)

The Sierra National Forest Land and Resource Management Plan (LRMP), signed in 1992, was developed to direct the management of the SNF. The goal of the LRMP is to provide a management program reflecting a mix of activities, allow use and protection of SNF resources and fulfill legislative requirements while addressing local, regional and national issues. To accomplish this, the LRMP describes how issues were dealt with, the desired future state of the SNF, forestwide management direction, management prescriptions for individual management areas; schedules of proposed and possible outputs and activities; management standards and guidelines (S&Gs); monitoring and evaluation requirements; and location maps. The LRMP is applicable to all National Forest lands administered by the SNF. (More detailed information on the LRMP can be found in Chapter 3 Section 3.1.7, (USDA-FS 1991; pp 1-1)).

One item specific to travel management in the LRMP is S&G #17. Its purpose was to keep as many OHV opportunities open as possible until an OHV Plan could be developed (as directed in the LRMP). S&G #17 currently states “...*Open all Maintenance Level 1 and 2 roads for OHV*”

use unless designated closed”, and allows for using mixed use roads to facilitate OHV travel on passenger car roads (ML 3-5). In the 1990s, the SNF developed an OHV Plan, however, the decision was appealed to the Regional Forester and the appeal was sustained.

Since the 1990 OHV Plan was never implemented, the SNF LRMP direction in S&G #17 (open ML 1 roads to OHV travel) remains in effect. However, Forest Service policy defines an ML 1 road as a road closed to all traffic (FSH 7709. 58 Sec. 12.3). Therefore S&G #17 contradicts this policy direction and needs to be resolved.

The NFTS is documented in the Forest Transportation Atlas consisting of spatial data (maps and GIS), inventory information (infrastructure database or INFRA, and signed paper Road Management Objectives (RMOs) and Trail Management Objectives (TMOs) documenting management decisions located at each ranger district. At the beginning of this travel management process the inventory data from INFRA was downloaded into a local spreadsheet in order to facilitate corrections and to provide maximum flexibility during the project analysis process.

During this travel management process, the GIS spatial data was corrected from new geographic positioning system (GPS) information and recent and improved aerial photography. Likewise the spreadsheet inventory was corrected as errors and omissions such as lengths, ownership, and surfacing were identified. All of the corrections to the Forest Transportation Atlas reflect exiting ground conditions and previous management decisions. The road and trail information displayed in Alternative 1 is considered to show the intended, corrected NFTS at the beginning of the travel management project in 2006.

After a decision has been rendered for the TM roads and trails, RMOs and TMOs will be rewritten and re-signed, documenting the final decision. Then the required corporate information will be uploaded back into the INFRA database for upward reporting and generation of the MVUM.

This travel management proposal is just one of many in the SNF’s continuing effort to manage the transportation system to meet current and future needs. Previous decisions established year-round and seasonal restrictions to protect resources, user safety and infrastructure investment. This has been accomplished through forest planning, vegetation management projects, watershed restoration projects, fuel treatment projects, trail construction projects, road decommissioning projects, trail management decisions, landscape analysis, watershed analysis and the annual district road management analysis and decisions. Currently the SNF operates under the 1977 OHV Plan, and current Road Management Objectives (RMOs). The NFTS is defined as the roads and trails (including all associated trailheads, parking lots, staging areas, and turnouts including parking within one vehicle length from the edge of roads or trails, unless otherwise prohibited) documented in the Forest Transportation Atlas and INFRA database. Ongoing efforts to continue improving the road network include: (1) efforts to reduce the impacts associated with unauthorized routes, (2) efforts to address natural and cultural resource impacts associated with the NFTS, and (3) efforts to contain costs. Implementation of this decision and subsequent designation of motorized trails through publication of the first MVUM are only one step in the overall management of the NFTS.

NFTS Roads

The SNF currently manages approximately 2,500 miles of NFTS roads, including all associated trailheads, parking lots, and turnouts. The current NFTS includes all SNF managed roads, including those closed year-round. Roads may be closed year-round for a variety of reasons including: protect facilities; reduce adverse effects on various natural, cultural or other resources; reduce maintenance costs; or minimize safety concerns (36 CFR 261.2).

Unauthorized Routes

In 2005, the SNF completed an inventory of unauthorized routes on NFS lands as described in the Notice of Intent (NOI) to prepare an Environmental Impact Statement published September 11, 2007 (Volume 72, Number 175) and identified approximately 550 miles of unauthorized routes. Many of the existing unauthorized motorized routes not currently part of the NFTS were developed for purposes other than recreation access. Past mining operations, timber sale projects and other access needs led to the creation of many of these routes. In some cases they have existed for decades. In other cases, they were recently created, by recreational users, as a result of expanding uses on the SNF. These routes were not designed for sustained public recreational use and in some cases do not adequately afford protection to critical forest resources.

The SNF then used an interdisciplinary process to conduct travel analysis that included working with the public to identify proposals for changes to the NFTS. Of the 550 miles identified in the 2005 inventory, some unauthorized routes were a full or partial alignment of an NFTS road and removed from consideration as possible additions to the NFTS. Additionally, the public specifically requested (during the 2007 scoping period for this EIS) that approximately 280 miles be added to the NFTS and 50 miles not be added (some unauthorized routes were in both “add” and “do not add” categories). The SNF reviewed every unauthorized route specifically requested (both to be added and not be added) to determine if they met the following criteria for continued analysis in the Travel Management EIS.

1. Did the route comply with current LRMP standards and guidelines?
2. Did the route meet the purpose and need?
3. Did the route provide for a diversity of motorized recreation opportunity?
4. Was the route located in such a way as to be sustainable over the long term?
5. Were natural and cultural resource concerns avoided or mitigated in the route’s current location?

If the answer to all the above questions was yes, then the route moved forward into one or more of the action alternatives.

In accordance with the Travel Management Rule, following a decision on this environmental analysis, the SNF will publish a MVUM identifying all Sierra NFTS facilities that are designated for motor vehicle use including describing where parking can occur. The MVUM shall specify the classes of vehicles and the times of year for which use is designated. Upon publication of the MVUM, it is prohibited to possess or operate a motor vehicle on NFS lands other than in accordance with those designations. These maps will be made available to the public on the internet at: http://www.fs.fed.us/recreation/programs/ohv/ohv_maps.shtml and at the headquarters on Tollhouse Road in Clovis, at Ranger Districts in Prather and North Fork, and at other administrative sites. Unauthorized routes not included in this FEIS are not precluded from future consideration for addition to the NFTS and inclusion in a MVUM. Future decisions associated with changes to the MVUM and the NFTS may trigger the need for additional environmental analysis, public involvement and documentation.

Areas

Areas are locations on National Forest System lands designated for motor vehicle use pursuant to 36 CFR 212.51 and on an MVUM. These areas provide a place for recreational vehicle use within a set perimeter. The SNF currently manages 5 areas (75 acres).

1.2.2 Project Location

The project is located on the SNF in Fresno, Mariposa and Madera Counties, California (See Vicinity Map, Figure 1- 1). The project area includes Sierra NFS lands (see Map of Project Area including Analysis Units, Figure 1- 2) with the exception of designated wilderness and special areas identified in the LRMP (e.g. the Kings River Special Management Area, research natural areas) (USDA-FS 1991: 4.3.19). Figure 1- 3 displays the areas where motorized cross-country travel is currently prohibited.

Maps

One map for each alternative can be found in Appendix K. In the electronic version of Appendix K (on CD and on the Web at <http://www.fs.us.fed/r5/sierra/projects/ohv>), these maps have a zoom feature to aid the reader in discerning details. Also, Appendix L includes a crosswalk of each proposed roads, motorized trail and area to its corresponding USGS quadrangle map. The map includes these legend items: Unauthorized Routes Added, Changes to NFTS, Existing NFTS (no change), and Motorized Open Areas. These legend items provide a visual synopsis of the four actions (see Chapter 2 Alternatives for description of actions) proposed in this FEIS.

Analysis Units

The SNF divided the project area into ten analysis units. The data is displayed by analysis units to help the reader better understand the difference between alternatives for specific geographic locations. These analysis units were delineated based on geographic areas where similar types of motorized recreation uses are known to occur. They are organized both here and in the document from north to south. Ranger district abbreviations are Bass Lake (BL) and High Sierra (HS) (See Table 1- 1 and Figure 1- 2). Please see the introduction to Chapter 3 for descriptions and acreage of each analysis unit and how data was displayed by analysis units to help the reader better understand the effects analysis.

Table 1- 1. Analysis Unit Abbreviations

Ranger District	Analysis Unit	Abbreviation
Bass Lake	South Fork Merced	SFM
	Westfall	WES
	Globe	GLO
	Gaggs	GAG
	Mammoth	MAM
High Sierra	Stump Springs-Big Creek	SSB
	East of Kaiser Pass	EKP
	Jose-Chawanakee	JCH
	Tamarack-Dinkey	TAD
	Dinkey-Kings	DNK

Figure 1- 1. Vicinity Map

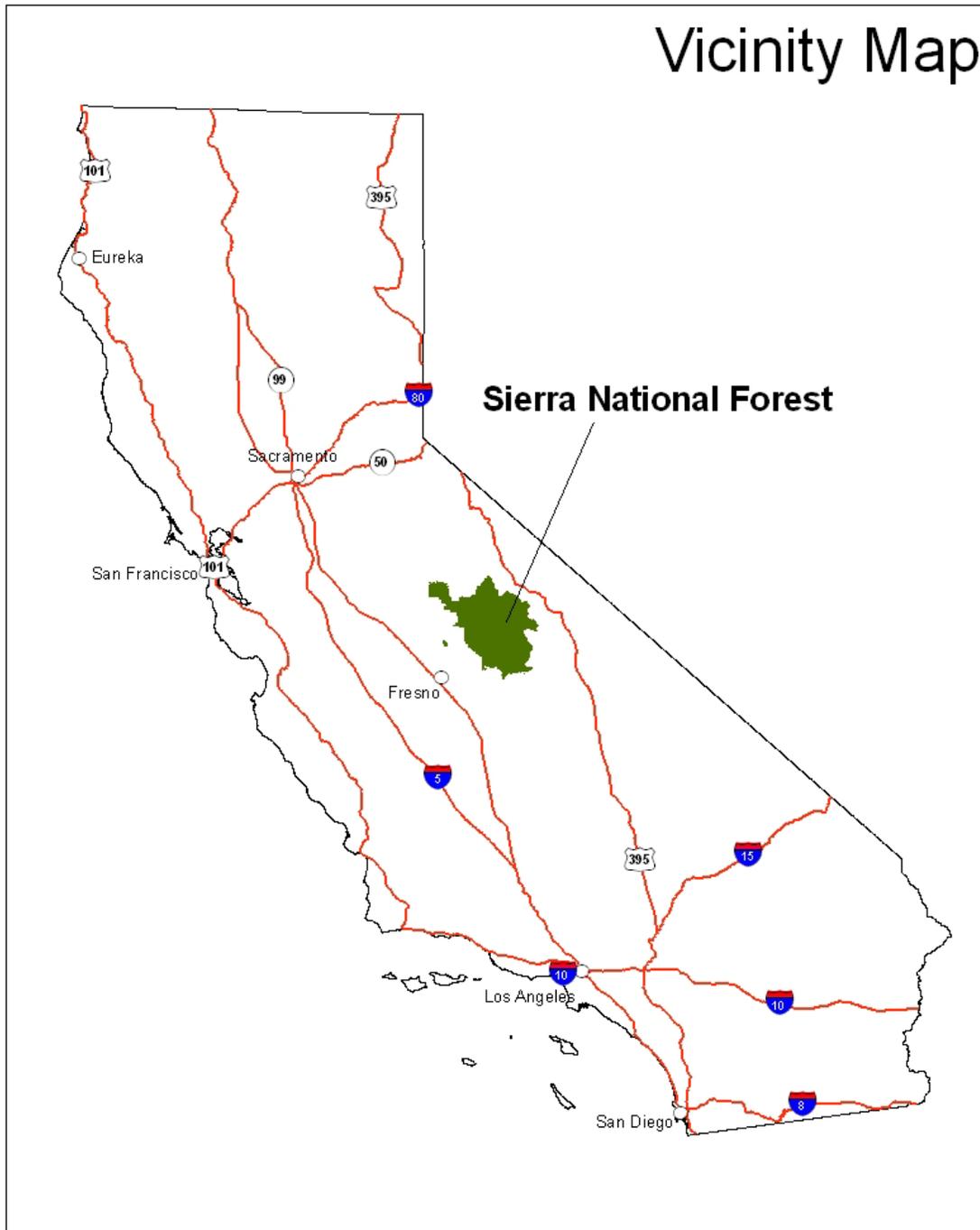


Figure 1- 2. Project Area with Analysis Units

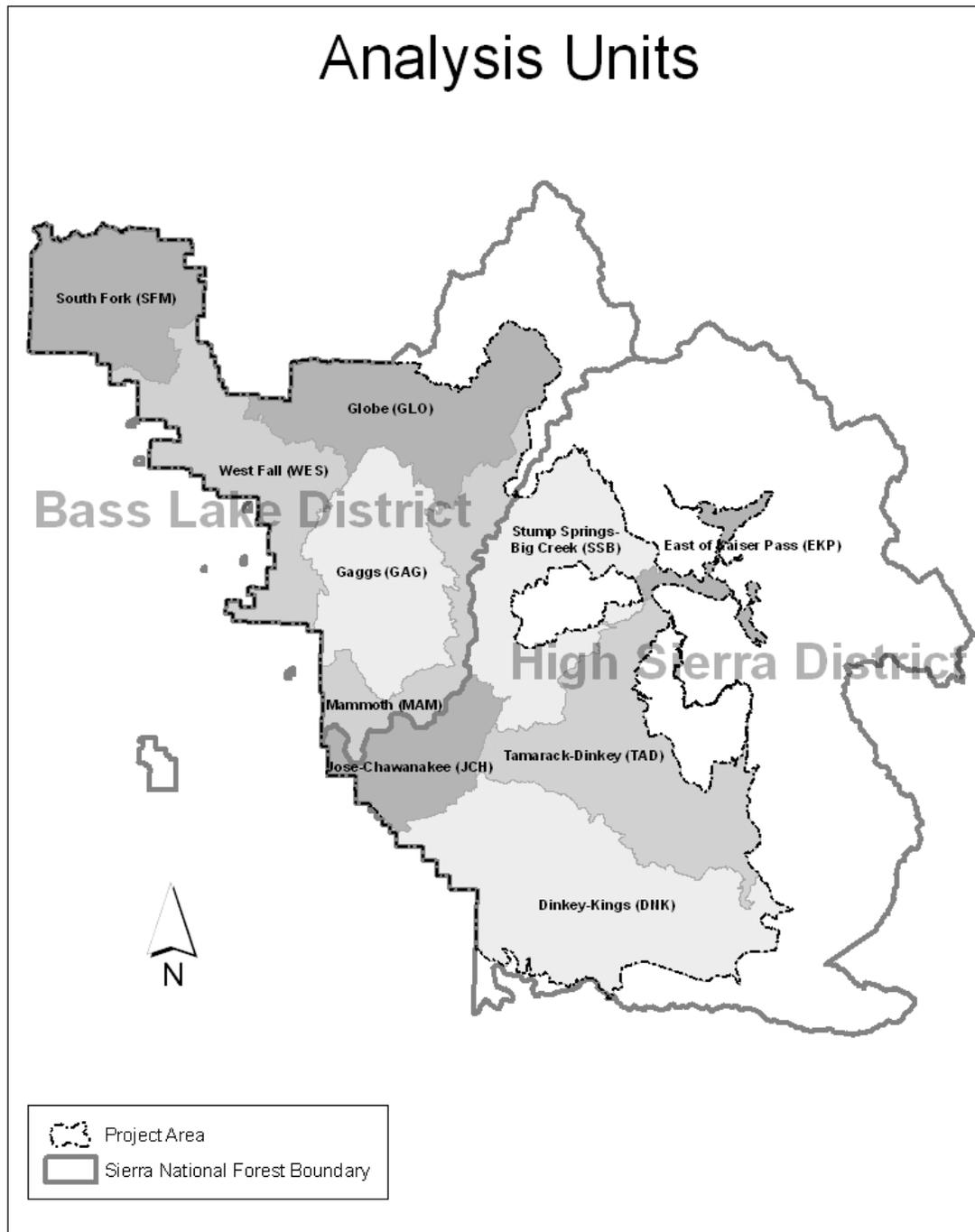
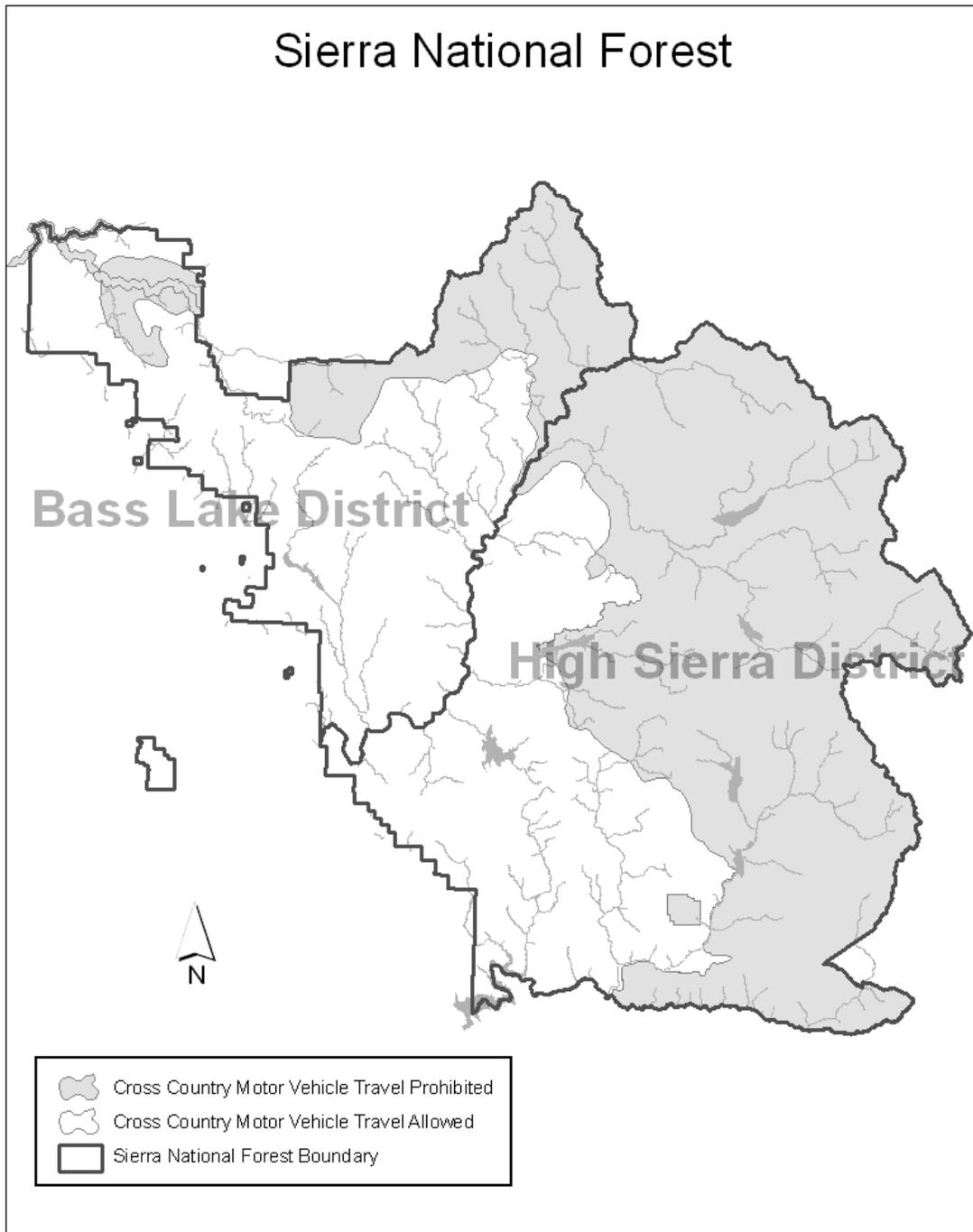


Figure 1- 3. Areas Where Motorized Cross-country Travel is Currently Prohibited



1.3 Purpose and Need

The following needs have been identified for this proposal:

1. **There is a need for regulation of unmanaged cross-country motor vehicle travel by the public.** The proliferation of unplanned, unauthorized, non-sustainable facilities created by cross-country travel adversely impacts the environment. The 2005 Travel Management Rule, 36 CFR Section 212 Subpart B, provides for a system of NFTS roads, NFTS trails and areas on National Forest System lands that are designated for motor vehicle use. After facilities are designated, motor vehicle use off designated roads and trails and outside designated areas is prohibited by 36 CFR 261.13. Subpart B is intended to prevent resource damage caused by unmanaged motor vehicle use by the public. In accordance with National direction, implementation of Subpart B of the Travel Management Rule for the SNF is scheduled for 2010.
2. **There is a need for additions to the SNF NFTS to:**
 - a. **Designate a system that provides a diversity of motorized recreation opportunities (4X4 vehicles, motorcycles, All Terrain Vehicles (ATV), Sport Utility Vehicles (SUV), passenger vehicles, etc).** It is Forest Service policy to provide a diverse system of motorized opportunities for experiencing a variety of environments and modes of travel consistent with the National Forest recreation role and land capability (FSM 2353.03(2)). Implementation of Subpart B of the Travel Management Rule will severely reduce acres and miles of motorized recreation opportunities relative to current levels. Without adding additional motorized facilities to the NFTS and designating them on a MVUM, the regulatory changes noted above would make continued use of unauthorized routes illegal and would preclude access by the public to many motorized recreation opportunities.
 - b. **Provide motor vehicle access to dispersed recreation opportunities (camping, hunting, fishing, hiking, horseback riding, etc.).** Dispersed recreation activities on the SNF depend on motorized access for parking or staging and these are typically accessed by short roads (spurs), some of which are currently unauthorized routes that are not part of the NFTS. Without adding them to the NFTS and designating them on a MVUM, the regulatory changes noted above would make continued use of such short spurs illegal and would preclude access by the public to many dispersed recreation opportunities.
3. **There is a need for changes to the SNF NFTS to:**
 - a. **Designate a system that provides a diversity of motorized recreation opportunities (4X4 vehicles, motorcycles, ATVs, SUVs, passenger vehicles, etc.).** For the same reasons as listed in 2.a. above regarding adding to the NFTS, changes need to be made to the NFTS to provide a diversity of road and trail opportunities. There is a need to provide for connectivity between added facilities and the current NFTS to provide a linked system that accesses a larger, more diverse riding opportunity. There is a need to provide enhanced quality of motorized recreation experience (e.g. loops). Without changing the NFTS to enhance motorized recreation opportunities, the continued current management of the NFTS would severely limit the diversity of opportunities (FSM 2353.03(2)). Critical to the SNF transportation system is making sure that

motorized recreation vehicles can move throughout the system in a legal and useful way with connectivity to other recreation opportunities.

- b. **Provide motor vehicle access to dispersed recreation opportunities (camping, hunting, fishing, hiking, horseback riding, etc.).** For the same reasons as listed in 2.b. above regarding adding to the NFTS, dispersed recreation activities on the SNF depend on motorized access for parking or staging. Some dispersed recreation opportunity is accessed by NFTS roads open to highway-legal vehicles only (HV). Those who recreate using non-highway legal vehicles (typically ATVs and motorcycles) are unable to legally ride on HV roads. Without changing the vehicle class to allow for mixed use, there is diminished connectivity between dispersed recreation opportunities (especially camping) and the motorized trail system. Additionally, many dispersed recreation opportunities are accessed by short roads (spurs). Some of these are currently ML 1 roads that would be closed to all vehicle traffic due to Forest Service policy. Without changing the vehicle class type, the regulatory requirements would make continued use of such short spurs illegal and would preclude access by the public to many dispersed recreation opportunities.
- c. **Review current seasons of use and modify as warranted to limit damage to facilities due to motor vehicle operation and avoid or lessen effects to other resources.** Motor vehicle use during periods when road beds are water saturated and easily impacted, leads to unnecessary maintenance costs and resource damage due to erosion. This type of damage can be prevented by changing the season of use of the facility to allow use outside of the wet season. Additionally, wildlife can be protected from disturbance during sensitive periods such as nesting/denning for the gestation or raising of young by designating appropriate seasons of use; effects (erosion) to cultural resources and rare plants can be avoided and; the risk of noxious weed spread can be decreased.
- d. **Resolve the conflict between Forest Service national policy regarding motorized use on ML 1 roads and the LRMP.** Forest Service policy requires that “ML 1 roads be placed in storage between intermittent uses.” Appropriate traffic management strategies are ‘prohibit’ and ‘eliminate’ all traffic. These roads are not shown on the motor vehicle use map (FSH 7700.59 62.32). Currently the SNF LRMP Standard and Guideline #17 (USDA-FS 1991) allows for ML 1 and 2 roads to be open for OHV use unless designated as closed. To be consistent with NF policy and the Travel Management Rule, there is a need to determine the appropriate traffic management strategy (including OHV use) for each of these roads. Without determining the appropriate traffic management strategy, the SNF will remain out of compliance with NF policy.

In making designations and changes to the NFTS, the SNF will be considering criteria contained in Subpart B of the Travel Management Rule, which includes the following:

- A. Impacts to natural and cultural resources.
- B. Public safety.
- C. Access to public and private lands.
- D. Availability of resources for maintenance and administration of roads, trails and areas that would arise if the uses under consideration are designated.
- E. Minimizing damage to soil, watershed, vegetation and other forest resources.

- F. Minimizing harassment of wildlife and significant disruption of wildlife habitat.
- G. Minimizing conflicts between motor vehicles and existing or proposed recreational uses of NFS lands or neighboring Federal lands.
- H. Minimizing conflicts among different classes of motor vehicle uses of NFS lands or neighboring Federal lands.
- I. Compatibility of motor vehicle use with existing conditions in populated areas, taking into account sound, emissions and other factors.

When making changes to NFTS roads, the SNF will also consider the following:

1. Speed, volume, composition and distribution of traffic on roads.
2. Compatibility of vehicle class with road geometry and road surfacing.
3. Maintaining valid existing rights of use and access (rights-of-way).
4. Purpose for the road and the opportunities the road offers.
5. Effectiveness of seasonal closure for resource protection while balancing for recreational opportunities.

1.4 Proposed Action

The proposed action discloses the changes to the NFTS and the prohibition of cross-country travel as described in the NOI with some modifications. After further analysis and public input in response to the NOI, discrepancies in the published proposed action were identified. This description of the proposed action (Alternative 2 in this FEIS) has been modified to accurately reflect proposed changes to the NFTS.

Prohibition of motor vehicle travel off the NFTS (roads, motorized trails, all associated trailheads, parking lots, staging areas, and turnouts including parking within one vehicle length from the edge of road or motorized trail) by the public, except as allowed by permit or other authorization (this prohibition would not apply to snowmobiles).

Additions to the NFTS: Based on the stated purpose and need for action and as a result of the roads analysis process, the SNF proposes to add 5 miles of roads and 39 miles of motorized trails to the NFTS. The SNF proposes to add one area, totaling 6 acres. Added facilities would include a proposed season of use and parking one vehicle length from the edge unless otherwise prohibited.

Changes to the NFTS: Based on the stated purpose and need for action, the SNF proposes to change vehicle class on 97 miles of NFTS roads, change the season of use on 898 miles of NFTS roads and 21 miles of NFTS trails, close 290 miles of NFTS roads (unless allowed by permit or other authorization), seasonally open 70 miles of NFTS roads, and change ML on 250 miles of NFTS facilities (See Appendix A, Proposed Changes to NFTS Roads and Trails, for complete tables).

Non-significant LRMP Amendments:

A. S&G # 22 Recreation – ROS Element Map: Removes 512 acres from Semi-Primitive Non-motorized ROS Class and adds 512 acres to Semi-Primitive Motorized ROS Class.

B. S&G # 17 Recreation – OHV: Amend LRMP S&G # 17 to state “... *allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions.* .”

1.4.1 Decision Framework

The responsible official will decide whether to adopt and implement the proposed action, an alternative to the proposed action or take no action for the following four action components:

1. Prohibit motor vehicle travel off the NFTS (roads, motorized trails, all associated trailheads, parking lots, staging areas, and turnouts including parking within one vehicle length from the edge of road or motorized trail) by the public except as allowed by permit or other authorization (this prohibition would not apply to snowmobiles).
2. Add unauthorized routes and areas to the NFTS (with seasonal restrictions and parking within one vehicle length from the edge of added roads or motorized trails, unless otherwise prohibited). Change allowable vehicle class, season of use and year-round closures on NFTS facilities.
3. Make two non-significant Land and Resource Management Plan (LRMP) amendments to
 - A) Standard and Guide (S&G) #22: make a change to adjust acres in ROS classes on the ROS Element map
 - B) Change to S&G #17 to state “... *allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions.* .”

This proposal does not revisit previous administrative decisions that resulted in the NFTS. This proposal is focused on implementing 36 CFR 212 Subpart B of the Travel Management Rule, updating the NFTS, and amending the LRMP to be compliant with this decision. Previous administrative decisions concerning road construction, road reconstruction, trail construction, and land suitability for motorized use on the NFTS are outside of the scope of this analysis.

1.4.2 Responsible Official

The Forest Supervisor for the SNF will be the deciding official. The Forest Supervisor will sign the Record of Decision (ROD).

1.4.3 Principle Laws and Regulations that Influence the Scope of this EIS

The National Environmental Policy Act of 1969 (NEPA) requires that all major Federal actions significantly affecting the human environment be analyzed to determine the magnitude and intensity of those impacts and that the results be shared with the public and the public given opportunity to comment. The regulations implementing NEPA further require that to the fullest extent possible, agencies shall prepare environmental impact statements concurrently with and integrated with environmental analyses and related surveys and studies required by the Endangered Species Act of 1973, the National Historic Preservation Act of 1966 and other environmental review laws and executive orders. Principle among these are the Multiple Use and Sustained Yield Act of 1960, the National Forest Management Act of 1976 as expressed through the LRMP, the Clean Air Act of 1955, the Clean Water Act of 1948 and the Forest and Rangeland Renewable Resources Planning Act of 1974.

The Travel Management Rule (36 CFR 251, 261, 295) provides criteria for the designation of roads, trails and areas. Providing safe transportation facilities and considering the affordability of

maintaining the transportation facilities are two of the criteria. The Travel Management Rule also requires that in designating NFTS roads, trails and areas, responsible officials consider the provision of recreational opportunities; public access needs; conflicts among uses of NFS lands, including other recreational uses; and the compatibility of motor vehicle use with existing conditions in populated areas.

1.5 Public Involvement

The interdisciplinary team relied on public involvement to ensure that a full range of alternatives, representing a broad array of perspectives, would be analyzed in this FEIS. Public involvement occurred during four key periods. First, during the public collaboration process that began in 2006, second during the 80-day public scoping period for the NOI, third during meetings with public groups to explore issues they raised during scoping, and fourth during the 60-day public comment period on the DEIS.

In the spring of 2006, the SNF held several public meetings to provide information regarding motorized use in the SNF. Meetings were held in Clovis on March 24, 2006; Oakhurst on March 26, 2006; and Mariposa March 29, 2006.

Most public comments centered on suggestions to change allowed vehicle class on specific NFTS roads. The Forest Service responded by evaluating the current road system for opportunities to increase vehicle access by changing some of the intended uses and proposing some motorized mixed use roads. These comments and others were incorporated by the Forest Service interdisciplinary team in the development of the proposed action for the NOI.

1.5.1 Eighty (80)-day Public Scoping Period for the Notice of Intent

In September, 2007, the Forest Service completed the “Proposed Action and Notice of Intent to Prepare an Environmental Impact Statement” based on comments from the meetings held in the spring of 2006 and internal scoping of resource specialists. The public comment period began on September 14, 2007. In response to requests from the public to extend the comment period, the comment period was extended twice and ended December 3, 2007. Initially, a copy of the proposed action was sent to approximately 200 interested parties and posted on the SNF Website. Four hundred additional copies of the proposed action were distributed at public meetings and by public requests. Approximately 800 people attended 5 informational public meetings (Mariposa, Oakhurst, Prather, Clovis and Yosemite National Park) and two all day workshops (Clovis and Oakhurst) that allowed them to interact with SNF employees on the proposed action. The SNF also responded to requests for informational meetings at specific clubs or organizations. In addition to receiving written comments, the SNF accepted comments electronically. Approximately 10,000 comments on the proposed action were received during scoping.

Public Meetings

Four public meetings were held with the objective of educating the public about the Travel Management Rule and introducing the proposed action. They were held from 6pm to 9pm at the following locations:

Mariposa	Sept 24, 2007 at the Best Western 4999 State Highway 49
Clovis	Sept 26, 2007 at the SNF Headquarters, 1600 Tollhouse Road
Prather	Sept 27, 2007 at the Auberry Middle School

Oakhurst Oct 2, 2007 at the Oakhurst Community Center, Road 425B

Two all day workshops were offered to provide individualized assistance for the public to assist in their ability to submit site specific comments. These were held from 9am to 5pm at the following locations:

Saturday, October 20th

Oak Creek Intermediate School
40094 Indian Springs Road
Oakhurst, CA 93644

Saturday, October 27th

Sierra National Forest
1600 Tollhouse Road
Clovis, CA 93611

Additional drop-in workshops and presentations were also held at the following locations:

North Fork Ranger Station, North Fork - Tuesday, November 27, 5pm–8pm

High Sierra Ranger Station, Prather - Wednesday, November 28, 5pm-8pm

Sierra National Forest Headquarters - Thursday, November 29, 5pm-8pm

Merced Sierra Club Meeting - November 15, 6pm-8pm

Yosemite National Park - November 30, 6pm-8pm

Consultation with interested individuals, organizations, and tribes is ongoing.

The following Native American groups were contacted: Big Sandy Rancheria, Cold Springs Rancheria, North Fork Rancheria of Mono Indians, Picayune Rancheria of Chukchansi Indians, American Indian Council of Mariposa County (Southern Sierra Miwuk Nation), Dunlap Band of Mono Indians and the North Fork Mono Tribe.

The public specifically commented on which unauthorized routes they requested for addition to the NFTS or opposed for addition to the NFTS. Requests include:

- 994 unauthorized routes (totaling 280 miles) for addition to the NFTS, and
- 130 unauthorized routes (totaling 52 miles) opposed for addition to the NFTS.

1.5.2 Public Comment Period: DEIS (60 days)

The Draft EIS (DEIS) was made available for public comment beginning April 28, 2009. The document was available on the SNF website and hard copies of the document, CDs and maps were mailed to 600 interested parties. The DEIS Notice of Availability was published in the Federal Register on May 8, 2009. Initially the comment period was for 45 days. In response to requests from the public, the comment period was extended and ended June 30, 2009. Copies of the DEIS were distributed at public meetings and by request. The forest hosted a Webinar on May 28, 2009; provided individual presentations to numerous clubs, organizations, individuals and local government; provided copies of the documents (hard copies, CDs, maps) via Forest Protection officers, law enforcement officers, recreation staff and at OHV events on the SNF; provided information and flyers to numerous motor vehicle vendors; and responded to frequent phone calls and e-mail requests for additional information.

Open Houses and Informational Workshops

Seven open houses and informational workshops were held soon after release of the DEIS with the objective of providing members of the public information about what is in the DEIS, how to navigate through the document and the electronic maps, when future public workshops were going to be held, to answer specific questions, and how and when to provide comments. Approximately 300 individuals participated. They were held at:

Oakhurst, May 5, 2009 at the Oakhurst Community Center, Road 425B

Madera, May 6, 2009 at the Madera Community College, Ave 12

Visalia, May 7, 2009 at the Visalia Convention Center, Acequia Ave.

Mariposa, May 11, 2009 at the Mariposa County Board of Supervisors Chambers

Prather, May 12, 2009 at the Foothill Middle School, Auberry Rd.

Clovis, May 13, 2009 at the Clovis Veterans Memorial Bldg. 4th Street

Merced, May 29, 2009 at the UC Cooperative Extension, Wardrobe Ave.

Two all day Saturday (June 6 and 13) and six weekday evening drop-in (May 26, 27, 28 and June 9, 10, 11) workshops were offered to provide individualized assistance for the public to assist in their ability to submit site specific comments. Approximately 400 individuals participated in these workshops. They were held at the District and Supervisor's offices in Prather, North Fork, and Clovis, California.

Tribal Government and Native American Interests

Tribal Governments and Native American Interests representing constituents in the project area were sent all public correspondence. The following offices received every mailing:

American Indian Council of Mariposa County, American Indian Center of Central California, Big Sandy Rancheria, Cold Springs Rancheria, Dunlap Band of Mono Indians, Haslett Basin Traditional Committee, Mono Nation, Native Earth Foundation, North Fork Mono Tribe, North Fork Rancheria, Picayune Rancheria, Table Mountain Rancheria, Sierra Mono Museum.

Government to government consultation:

Coarsegold, May 11, 2009: Consultation with Picayune Rancheria.

North Fork, January 23, 2008; August 14, 2008; and September 22, 2009 Consultation with North Fork Rancheria.

Elected Officials

Elected officials representing constituents in the project area were sent public correspondence and documents. The following offices received documents and were notified of travel management activities:

Fresno, Madera, and Mariposa County Boards of Supervisors, US Representatives Jim Costa, Devin Nunes, and George Radanovich, US Senators Barbara Boxer and Diane Feinstein.

The following officials requested and received e-mail updates:

The Offices of: Tom Wheeler, Madera County Supervisor; Jim Allen, Mariposa County Supervisor; Bob Waterson and Debbie Poochigian, Fresno County Supervisors; George and Devin Nunes, US Congress; and Diane Feinstein, US Senate. Many local, state, and federal elected officials, or their designees, attended the public meetings.

Coordination with Elected Officials

The following presentations and coordination meetings with Madera, Mariposa and Fresno County officials took place:

Madera, October 10, 2007: Bass Lake District Ranger made presentation to Madera County Board of Supervisors. Supervisors passed a resolution to request the Forest Service for more time to consider the Proposed Action.

North Fork, January 17, 2009: Bass Lake District Ranger met with Madera County Supervisor Tom Wheeler to brief him on SNF activities including the travel management project.

North Fork, February 4, 2009: Bass Lake District Ranger met with Madera County Supervisor Tom Wheeler and Mariposa County Supervisor Jim Allen to brief them on SNF activities including the travel management project.

Oakhurst, April 28, 2009: Bass Lake District Ranger made a presentation at Madera County Supervisor Wheeler's Town Hall meeting for his constituents.

Coarsegold, June 9, 2009: Bass Lake District Ranger made a presentation at Madera County Supervisor Wheeler's Town Hall meeting for his constituents.

Mariposa, May 11, 2009: Bass Lake District Ranger discussed the SNF travel management project with Mariposa County Supervisor Lyle Turpin, while both attended the Mariposa DEIS Public Meeting.

Specific meetings with county officials were requested and presented at the following:

Fresno, May 18, 2009 presentation to representatives of the Fresno County Recreation and Wildlife Commission arranged by Dale Tartaglia to present the components of the DEIS and participated in discussions about perceived loss of motorized recreation opportunities.

Fresno, May 20, 2009 presentation to Fresno County Supervisor Debbie Poochigian to discuss timeline, unauthorized routes, and other concerns the Supervisor was hearing from her constituents.

Events, Club Meetings, and Field Contacts

SNF provided information and materials at the following:

High Sierra Ranger District June, 2009 Forest Service Training: Training session for Forest Service field staff (law enforcement, recreation, and fire prevention staff) to provide information and education to the public regarding the Travel Management Project. Approximately 25 employees attended.

Sierra National Forest, June, July, August, 2009 dissemination of Travel Management Information to Forest Visitors: Forest Service field staff provided information to forest visitors engaging in recreation activities (motorized and non-motorized activities).

Madera, April 28, 2009 presentation to Madera County Sheriff's Department: Bass Lake Ranger District staff was invited to present Travel Management information to a training workshop for Madera County Sheriff's Department. Approximately 15 law enforcement personnel were in attendance.

Fresno, May 23-24, 2009 at the Hmong Water Festival: Approximately 15,000 people attended the Festival. Approximately 200 people stopped at the FS Travel Management informational booth.

High Sierra RD, May, June, and August 2009 4X4 Events (Poker Runs): During nine event days in the Blue Canyon, Jose Basin, Bald Mountain, and Swamp Lake areas High

Sierra District staff made information on the Travel Management project available to all participants in the events.

Fresno, July and August, 2009 4X4 Club Meetings: High Sierra District Staff presented information to 5 different local 4X4 Club Meetings (4X4 Club of Fresno, Hang N High 4X4 Club, Mt. Toppers 4X4 Club, Clovis Independent 4X4 Club, and 4X4 Him Christian Wheelers. Approximately 175 people attended.

Public Comments on the DEIS

In response to the Forest's request for comments during the DEIS comment period, 4673 interested parties submitted 4663 responses. Some parties requested additional information about the DEIS; these were not counted as responses. Most (4325), were one of 12 different form letters. Three hundred and eleven (311) were unique (not form) letters. The overwhelming majority of responses were received via e-mail, with 53 via postal mail, one hand-delivered, one FAX, and one was phoned in.

The SNF documented, analyzed, and summarized public comments using a process called content analysis. This is a systematic method of compiling and categorizing the full range of public viewpoints and concerns regarding a plan or project. Content analysis ensures that every comment is considered. Content analysis is intended to facilitate good decision-making by helping the IDT to clarify, adjust, or incorporate technical information into the FEIS. The process facilitates the Forest's response to comments. Twelve hundred seventy-three (1,273) comments were determined to be substantive.

In the content analysis process, each letter receives a unique identifying number. All letters were analyzed and each comment was categorized by specific topics, concerns, or routes. These categorized comments were then given a unique number, which allows analysts to link specific comments back to the original letter. The comments were then entered into the database.

Respondent names and addresses are also entered into a database, enabling the creation of a complete mailing list of all respondents. The database is also used to track pertinent demographic information such as responses from special interest groups or Federal, State, tribal, county, and local governments.

Substantive comments to the DEIS raised concerns and issues regarding the topics described below (categorized by chapters in the FEIS):

Chapter 1 - Purpose and Need: Purpose and Need, Principle Laws and Regulations that Influence the Scope of the EIS, and Public Involvement

Chapter 2 – Alternatives: Development of Alternatives, Adequacy and Range of Alternatives, Against Motorized Use, In Support of Motorized Use, and Comparison of Alternatives

Chapter 3 - Affected Environment and Environmental Consequences

Social Environment: Transportation Facilities, Recreation Resources, Society, Culture and Economy, Visual Resources, and Cultural Resources

Physical Environment: Air Quality, Soil and Geologic Resources, and Water Resources

Biological Environment; Botanical Resources, Noxious Weeds and Invasive Species, Terrestrial Wildlife, and Aquatic Biota

Chapter 4 - Consultation and Coordination

Chapter 5 - Index

Appendices

Additional Comments; Adequacy of Data and Analysis, Technical and Editorial Accuracy, Map Corrections, Implementation, Funding, Monitoring, Enforcement, Outside the Scope, and Perspective on Decision Making

The IDT reviewed and responded to comments as categorized in the database. Those comments that follow a specific theme were grouped and responded to collectively. Unique comments were responded to individually (see Appendix M for the full set of substantive comments and responses).

1.5.3 Issues

Comments from the public and other agencies were used to formulate issues concerning the proposed action. An issue is defined as a matter of public concern regarding the proposed action and its environmental impacts. The Forest Service separated the issues into two groups: significant and non-significant. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those (1) outside the scope of the proposed action; (2) already decided by law, regulation, LRMP or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." A list of non-significant issues and reasons why they were found non-significant may be found at the SNF Forest Supervisor's Office, Clovis, CA in the project record.

The SNF identified the following significant issues during scoping:

1. Issue: Impacts to Motorized Access

Discussion: There is concern that the proposed action does not provide adequate motorized access to routes and other motorized recreational areas and would not provide a variety of types of motorized recreational experiences. Public comments indicate that motorized access would be prohibited in areas including dispersed campsites, vistas, picnic areas, OHV staging and off-loading areas, equestrian parking areas, hang gliding, fishing and rock climbing areas which have been enjoyed by the public for many years. It is perceived that the proposed action does not provide enough opportunities specifically for motorcycles and ATVs or for loops and technical areas (hill climbs, rock crawling, etc.) and this limits the variety of motorized recreational experiences the public desires. Some commenters have historic ties to certain locations that would not be accessible in the proposed action. Some people also voiced concerns that motorized access from their private property onto National Forest System lands would be prohibited, which they feel would affect their enjoyment of their property.

2. Issue: Motorized Use and Ownership Conflicts

Discussion: There is concern that the number of miles of routes open under the proposed action, as well as the location of some of those routes would result in conflicts between motorized and non-motorized users and conflicts between different types of motorized users (4X4, ATV, motorcycle). Some members of the public believe that concentrating motorized use to designated routes and areas would cause overcrowding of those areas which could increase conflicts, leading to an overall degradation of the recreational experience. Some comments indicated that there would be conflicts with private property owners once the use of certain routes near private property increases due to this concentration of users.

3. Issue: Impacts to Natural and Cultural Resources

Discussion: There is concern that the proposed action would result in impacts to natural and cultural resources. Habitat degradation, soil erosion, spread of noxious weeds and crushing of plants were mentioned as impacts to vegetation. Habitat degradation and noise disturbance were cited as impacts to wildlife habitat. Loss of groundcover, soil erosion and sedimentation into streams, especially related to trails crossing streams, were noted to impact water quality and aquatic habitat. Some concerns were expressed for motorized use in specific areas with cultural resource values. Concern was also articulated over impacts to air quality resulting from the operation of ATVs and motorcycles.

4. Issue: Impacts to Non-Motorized Recreational Experiences

Discussion: There is concern that the motorized access allowed in the proposed action would impact both the availability of opportunities and the quality of non-motorized recreation. This was particularly important to hikers, hunters and anglers. Everyone who expressed this concern mentioned the impacts of vehicle noise and trail dust on their experience. Hunters and anglers noted that easy access increases the pressure on fish and wildlife. This can reduce hunting and fishing success and/or the size of the animals present. Anglers were concerned that motorized access into certain areas could result in trail erosion and sedimentation of prime angler streams, reducing the viability of the populations found there.

Changes between the DEIS and the FEIS

Based on both public comment and Forest Service review, changes made between DEIS and FEIS respected the original intent of the alternatives, however, many (previously not considered) unauthorized routes were considered to be added to or eliminated from the various alternatives. In addition the public also identified data omissions, errors, and missing NFTS roads. The following types of changes and clarifications were applied to the FEIS:

NFTS Trail Corrections Applied to the FEIS

Approximately 56 miles of NFTS roads have been historically mapped and managed as motorized trails. These motorized trails have been administratively moved from the NFTS INFRA roads database to the trails database.

NFTS Road Corrections Applied to the FEIS

During public scoping the public identified routes desired to be added, and not to add to the NFTS. A portion of these (approximately 200 miles of unauthorized routes) were determined to be existing alignments of NFTS roads (see Appendix N of the FEIS) that have been continually operated and maintained, and were thus added to the NFTS INFRA database. These were removed from the action “Additions to the NFTS” in the appropriate alternatives in the FEIS and were added to the maps and Appendix A in the FEIS. Other non-Forest Service roads were identified (such as county, special use, and private roads) and mistakenly displayed in the DEIS; they have been removed from the FEIS Appendix A, Table A-3 and the alternative maps.

In one case, the Snow Corral Road, the vehicle class of a NFTS road was displayed in error in the DEIS, this was changed in the FEIS.

Other Corrections Applied to the FEIS

Data Omissions – In cases where omissions in data were identified by the Forest Service or the public, those omissions were fixed in the FEIS. For example; in the DEIS some of the analysis data for western bats was not included, this was fixed in the FEIS.

Corrections and Edits – Where data pertinent to the analysis was identified between DEIS and FEIS it was include and analyzed. For example; in the DEIS economic analysis, the data was updated to reflect the 2007 visitor use information that had been disclosed in the Recreation section of Chapter 3 in the DEIS. The updated data was utilized and the analysis reflects the new data.

In the Summary Comparison of Alternatives by Environmental Effects Table (DEIS Table 32, FEIS Table 2-12) at the end of Chapter 2, data describing the total annual maintenance costs for NFTS roads and trails was edited to more accurately account for expected annual costs and to change how the costs were displayed from the expected change when compared to Alternative 1 to the actual expected cost for each alternative. Data describing the initial implementation costs were recalculated based on more accurate estimates of required prescriptive actions.

Clarifications – Public comment drove the clarification of items in all sections of the FEIS. These clarifications ranged from adding a few words to help the reader more fully understand the content and rationale of a section to expansion of summary and comparison tables. For example; the abbreviations of reasons for road closures and season of use applied to NFTS roads in Appendix A, Table A-2 were improved, and the Summary Comparison of Alternatives Table (DEIS Table 31, FEIS Table 2-11) in Chapter 2 was expanded to better describe the extent of actions in each alternative.

CHAPTER 2 – ALTERNATIVES

2.1 Introduction

This chapter describes and compares the alternatives considered for the SNF Travel Management FEIS. It describes the five alternatives considered in detail as well as those eliminated from detailed study. At the end of this chapter the alternatives and their environmental impacts are displayed in summary tables so they can be readily compared.

Based on the issues identified through public comment on the proposed action, the Forest Service developed three alternative proposals that achieve the purpose and need differently from the proposed action. In addition, the Forest Service is required to analyze a no action alternative. The proposed action, other action alternatives and no action alternative are described in detail below.

2.1.1 Terminology and Abbreviations

Terminology and abbreviations used to describe the alternatives are defined in Appendix F. Appendix F contains terminology and abbreviations as defined in the Travel Management Rule, Forest Service Manual (FSM) and Forest Service Handbook (FSH).

2.1.2 Chapter 2 Organization

The chapter is divided into four parts:

- Part 1 describes how the alternatives were developed.
- Part 2 presents the alternatives considered in detail.
- Part 3 presents the alternatives that were considered, but eliminated from detailed analysis. It includes the rationale for eliminating these alternatives.
- Part 4 compares the alternatives based on their environmental, social and economic consequences and includes a comparative display of the projected effects of the alternatives.

2.1.3 Maps

One map for each alternative can be found in Appendix K. In the electronic version of Appendix K (on CD and on the Web: <http://www.fs.us.fed/r5/sierra/projects/ohv>), these maps have a zoom feature to aid the reader in discerning details. Also, Appendix L includes a crosswalk of each proposed road, motorized trail and area to its USGS quadrangle map.

2.2 Part 1 – Alternative Development

The Forest Service used the significant issues listed in Chapter 1 to develop three alternatives to the proposed action (Alternatives 3, 4, and 5). The alternatives provide different approaches to:

- Fulfill the purpose and need for the project as described in Chapter 1, and
- Address the significant issues.

The Forest Service used different approaches to reduce or avoid effects on natural and cultural resources in the different alternatives. In alternatives that emphasize avoiding resource impacts and conflicts, those unauthorized routes that would likely cause impacts to resources are not proposed for addition to the NFTS, unless there was an overriding need or purpose for the route

and effects could be successfully mitigated. In contrast, alternatives that emphasize the need for providing access and motorized recreation add additional unauthorized routes to the NFTS—including some in higher risk or more sensitive areas—and propose additional mitigations to reduce effects.

In alternatives 2, 4, and 5, proposed NFTS additions were focused on access to key destinations, loops and connectors which provide longer riding time, and an increase the diversity of opportunities for different vehicle classes (ATVs, motorcycles, full-size 4WD).

2.2.1 Purpose and Need Emphases by Alternative

The following describes how each alternative meets the purpose and need described in Chapter 1.

Alternative 1 does not meet the purpose and needs defined for the project.

Alternative 2 meets the need to prohibit cross-country motor vehicle travel and resolving conflicts between national policy and the LRMP. This alternative meets the need for a diversity of travel (both through additions and changes to the NFTS), access to dispersed recreation, and review of NFTS seasons of use to a minimum level. Alternative 2 puts some emphasis on resource damage prevention and results in the greatest reduction in NFTS maintenance costs. It resolves the conflict between Forest Service national policy regarding motorized use on ML 1 roads and the LRMP.

Alternative 3 meets the need to prohibit cross-country motor vehicle travel however it does not meet any of the other needs for the action.

Alternative 4 emphasizes the need for prevention of resource damage while meeting the need to prohibit cross-country motor vehicle travel and resolving conflicts between national policy and the LRMP. Alternative 4 provides a moderate amount of recreation diversity and access moderately reduces NFTS maintenance costs and maximally implements season of use changes for the protection of wildlife.

Alternative 5 meets the need to prohibit cross-country motor vehicle travel and resolves conflicts between national policy and the LRMP. It balances the need for prevention of resource damage while providing for maximized motorized recreation diversity and access. It moderately reduces NFTS maintenance costs and implements season of use changes to a high degree.

2.2.2 Refining Alternatives Submitted by the Public during Scoping and the DEIS Public Comment Period

During the 80-day public scoping process, alternative concepts were submitted for consideration by two main groups. One group primarily expressed concerns about ensuring adequate motorized recreation opportunities; the other was primarily focused on resource protection. The resulting alternatives incorporate these and other suggestions offered by the public.

Also important in this process was the information gathered by the Forest Service in their consultation and discussions with tribal representatives, local counties and Forest Service employees. State and Federal agencies advised the process through numerous informal contacts.

During the 75-day public comment period on the DEIS, comments received prompted the SNF to refine several items including: clarification of the description of alternatives, correction of road and data errors, and thoroughly reviewed, considered, and changed the actions required prior to designation on the MVUM.

Some DEIS commenters proposed designation of all routes currently used by motor vehicles unless it caused considerable effects. The proposal included employing mitigation measures to

the greatest extent possible in order to designate the maximum number of routes possible. The Forest Service is currently analyzing Alternative 5, which proposes to add the most miles (compared to the other alternatives) of motorized recreation opportunities by specifying mitigations to reduce adverse effects. Other DEIS commenters suggested that the SNF develop an alternative eliminating unauthorized routes that are redundant or of low recreational value. The recreational value of a route was considered in all action alternatives, although these considerations were given more or less weight depending on the overall objectives and emphasis of the alternative. This proposal has been incorporated into all action alternatives analyzed. In Alternative 5, for example, the emphasis was on adding more unauthorized routes to the system as roads and trails, focusing on routes which form loops or connectors or those which can be managed as motorized trails for different types of vehicles. Alternative 4 adds fewer miles of routes to the system by avoiding more routes with existing or potential resource concerns (this includes routes with known recreational value).

Some DEIS commenters suggested that alternatives be developed that maximize motorized recreation opportunities including options for motorcycles and ATVs, provide the ability to recreate on loops and in technical areas, and provide access to dispersed campsites. Alternative 5 was developed to maximize route additions based on public comments, placing particular emphasis on routes which provide access to key destinations, loops and connectors providing longer riding time, routes which increase the diversity of opportunities for different vehicle classes (ATVs, motorcycles, full-size four-wheel drive), and routes that provide semi-primitive riding experiences. Additionally in various alternatives, routes were added to provide access to key dispersed camping opportunities.

Some DEIS commenters suggested that the SNF designate use on routes and prescribe mitigation measures to address environmental issues, instead of not designating these routes because their use could result in unacceptable environmental effects. As described in section 2.3.6 of this chapter, *Design Features, Mitigation Measures and Preventative Measures*, Alternatives 2, 4 and 5 were designed to open routes to public use on the condition that prescribed mitigations are completed prior to designation (i.e., publication on the MVUM). Such mitigations are assigned based on the severity of the effect.

DEIS commenters suggested that an alternative be developed that was a balance between motor vehicle access, affordability and environmental stewardship. This was considered and Alternative 5 was developed and refined to achieve this balance.

Some DEIS commenters suggested that the SNF consider an alternative that would implement the provisions of Subpart A of the Travel Management Rule to identify the minimum road system needed for administration, utilization, and protection of NFS lands including closing existing NFTS roads and trails, changes in seasonal closure, changes in vehicle class and amending the LRMP to add trails in semi-primitive non-motorized areas. Although full implementation of Subpart A was beyond the scope of this EIS, alterations to the NFTS to make it compatible with the proposed designated system have been incorporated to a greater or lesser extent in Alternatives 2, 4 and 5 to give the decision maker several options to consider.

Some DEIS commenters suggested that an alternative be considered that adds no additional routes to the NFTS, adds more seasonal restrictions, closes ML 1 roads, and closes sensitive NFTS roads and trails (especially trails in the El Portal area and within roadless areas). This alternative has aspects of both Alternative 3 and Alternative 4 and therefore the effects of this proposed alternative are being analyzed.

Some DEIS commenters suggested considering an alternative that modifies Alternative 2 to restore existing NFTS roads into the system reducing illegal use and the long-term effects of

erosion. Alternatives 2, 4 and 5 were designed to incorporate changes to the NFTS to make it a more useful, environmentally sensitive and cost effective system.

Some DEIS commenters suggested that recreation opportunity would be maximized by changing the designation on unwarranted roads open to highway licensed and insured drivers of non-highway legal vehicles to open to all vehicles. Alternatives 1, 2, 3 and 4 all analyze 0 miles of roads open to highway licensed and insured drivers of non-highway legal vehicles. Alternative 5 analyzes 22 miles of roads open to highway licensed and insured drivers of non-highway legal vehicles while maximizing the number of roads changed from highway-legal vehicles only to all vehicles (154 miles) compared to the other alternatives.

2.3 Part 2 – Alternatives Considered in Detail _____

Four action alternatives (Alternatives 2, 3, 4 and 5) and a no action alternative (Alternative 1) are analyzed in detail in this FEIS. The no action alternative represents the continuation of cross-country travel where motor vehicle travel is allowed (See Figure 1-3). This alternative serves as a baseline for comparison among the alternatives and is required by the implementing regulations of NEPA.

The project area for the alternatives includes the NFS lands displayed in Figure 1- 2. The project area does not include private, State, or other Federal lands.

Each alternative assumes that adjacent Federal lands, such as those administered by the National Park Service and Bureau of Land Management, will be managed according to existing management plans and applicable federal laws. Each alternative also assumes that private lands will meet applicable State and Federal land use regulations.

Part 2 includes information about how prescriptive actions (mitigation measures and design features) were applied to avoid, reduce or eliminate potential adverse environmental effects, the expectations for monitoring, and road and trail maintenance common to all alternatives.

Descriptions of the Alternatives

This section describes each of the five alternatives considered in detail. Alternative 1 is the no action alternative. Alternatives 2-5 are action alternatives. There are four key actions addressed in each alternative, they are:

1. **Cross-country Travel:** All of the action alternatives prohibit public motor vehicle travel off the NFTS (roads, motorized trails, all associated trailheads, parking /staging areas, and turnouts including parking within one vehicle length from the edge of road or motorized trail) by the public except as allowed by permit or other authorization (this prohibition would not apply to snowmobiles). The prohibition of cross-country motor vehicle travel is included in order to address the need to regulate motor vehicle use.
2. **Additions to the NFTS:** Additions to the NFTS are: **a.** roads, **b.** motorized trails, and **c.** areas. Alternatives 1 and 3 propose no additions (roads, motorized trails, and or areas) to the NFTS. Alternatives 2, 4, and 5 each propose a unique set of additions to the NFTS. Proposed additions to the NFTS would be designated on the MVUM as part of the NFTS. Designations (of roads and motorized trails) include the width of the road or trail surface, the necessary width for vehicles to pass safely without damaging resources or facilities. Designation of areas can be of two types: 1) areas are open to all vehicles (AV) and the designated acreage can be used for motorized recreation, and 2) parking/staging areas are open to highway-legal vehicles (HV) for parking and staging purposes. Designation also allows for parking a motor vehicle on the side of the road within one (perpendicular) vehicle length of the road edge,

when it is safe to do so and without causing damage to NFS resources or facilities, unless prohibited by state law, a traffic sign, or an order. Where prescriptive actions (design features and/or mitigation measures) are identified for a proposed road, trail, or area such actions must be completed prior to designation for public motor vehicle travel. Additions to the NFTS (including prescriptive actions) are displayed by route number in Appendix A.

3. **Changes to the NFTS:** Alternatives 1 and 3 make no changes to the NFTS. Alternatives 2, 4 and 5 make varying amounts of changes to the NFTS in the four categories described. Changes to the NFTS are displayed by road or motorized trail number in Appendix A.

- a. **Changes to vehicle class.** Vehicle class indicates the type of vehicle (passenger car, motorcycle, all-terrain vehicle, etc.) allowed to operate on a road or motorized trail. Because proposed changes in vehicle class for NFTS roads and motorized trails are primarily based on existing tread width and characteristics, this action will align current and intended management of these roads and motorized trails, and would not require actively changing the characteristics of the road or motorized trail (A comparison of changes proposed by alternative is found in Appendix A). Changes to vehicle class are:
 - Change from seasonally open to all vehicles (AV) to seasonally open to highway-legal vehicles (HV).
 - Change from road open to AV to motorized trail open to AV.
 - Change from road open to HV to open to AV. In this situation, both highway-legal vehicles and non-highway legal vehicles are allowed.
 - Change from road open to HV to open to HV and AV with HLO. In this situation, highway-legal vehicles are the norm and portions of the road also allow all vehicles that have highway licensed operators.
- b. **Changes to Season of Use.** The time of year the NFTS road or motorized trail is open may change based on compliance with the LRMP, mitigation of environmental effects, and/or administrative needs.
- c. **Changes to Closed Year-round.**
 - Some roads proposed to be closed year-round would be based on compliance with National Forest policy regarding public motorized use on ML 1 roads (FSH 7700.59 62.32). The policy states: “ML 1 roads have been placed in storage between intermittent uses. Appropriate traffic management strategies are ‘prohibit’ and ‘eliminate’ all traffic. These roads are not shown on motor vehicle use maps.” See purpose and need item 3.d. in Chapter 1, Section 1.3.
 - Some NFTS roads proposed to be closed year-round are related to Forest Service administrative needs. The action alternatives propose changes in public motorized access to NFTS roads currently used for the administration and management of the Forest, including Forest Service administrative facilities, authorized special uses, and legal rights of access.
 - Some NFTS roads proposed to be closed year-round are related to compliance with the LRMP. The action alternatives propose changes in public motorized access to NFTS roads currently available to the public to comply with resource protection measures required by the LRMP as amended. This action responds to the need to comply with the LRMP by prohibiting (closing year-round) public access on certain roads as listed in Appendix A.

- Roads proposed to be changed from closed year-round to seasonally open have been determined to meet recreational and other NFS needs.
 - d. **Changes to operational maintenance level (ML).** Some changes to the operational maintenance level on NFTS roads results in changes to vehicle class. The changes proposed are: change from current ML to a different ML or change from a road to a motorized trail.
4. **Two Non-significant LRMP Amendments.** Alternatives 2, 4 and 5 propose two non-significant LRMP amendments. For S&G #22, alternative 2 proposes fewer acres change to ROS classes than Alternatives 4 and 5. Alternatives 2, 4 and 5 propose the same changes for S&G #17.
- a. S&G # 22 Recreation- ROS Element Map: Adjust acres from Semi-Primitive Non-motorized ROS Class to Semi-Primitive Motorized ROS Class.
 - b. S&G # 17 Recreation- OHV: Changes to state “... *allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions.* .”

2.3.1 Alternative 1 – No Action

Alternative 1 provides a baseline for comparing the other alternatives. Under the no action alternative, current management consists of managing off-highway use as determined by the LRMP direction. Current LRMP direction guides the forest to develop a new OHV plan that designates an OHV route system to replace the 1977 Off Road Vehicle (ORV) Plan (USDA-FS 1991, 4.3.4 Recreation pp 4-3). Provisions of the 1977 ORV Plan remain in effect (until this travel management decision is implemented). The 1977 plan identifies areas where cross-country motor vehicle travel is prohibited (see Figure 1-3). In this alternative, 605,000 acres of National Forest System lands would remain open to cross-country motor vehicle travel. Current season of use (including roads closed year-round) management of the NFTS is defined under the SNF 1998 Road Closure Plan and implemented by Forest Order R5-83-3. To more accurately reflect the NFTS in this FEIS, modifications to the 1998 Road Closure Plan are incorporated into the NFTS. Modifications from 1998 to the present include road decommissioning, application of seasonal closures to some roads and administrative conversion of 56 miles of primitive rough graded NFTS roads to NFTS motorized trails. These modifications are incorporated into the GIS and INFRA databases to recognize roads which have historically been operated and maintained as part of the NFTS. This alternative continues to implement the 1998 Road Closure Plan as modified. Actions are listed in Table 2- 1.

In Alternative 1, no additions or changes would be made to the current NFTS (as modified) and no cross-country travel prohibition would be put into place. No non-significant LRMP amendments would be made. The Travel Management Rule would not be implemented and no MVUM would be produced. Motor vehicle travel by the public would not be limited to designated NFTS facilities, except within areas described in the 1977 ORV Plan and forest order. Unauthorized routes would continue to have no status or authorization as NFTS facilities.

The first column of Table 2- 1 (Alternative 1 by design component) describes the actions proposed in Alternative 1 and also provides information on the current management for each action. The second column (net result to NFTS) describes the resulting changes (if any) to the NFTS.

Table 2- 1. Alternative 1 – Actions

Notes: Except when x<1: miles and acres rounded to the nearest whole number; AV= all vehicles; HV= highway-legal vehicles only; MC= motorcycles only; ML= maintenance level; AV HLO= highway-legal vehicles and all vehicles with highway licensed operators

Alternative 1 by Decision Component	Net Result of Alternative 1 to NFTS
1. Cross-country travel	
No change from current management; cross-country travel is allowed (see Figure 1-3 where currently prohibited)	Continues (605,000 acres open to motorized cross-country travel).
2. Additions to the NFTS (appropriate season of use applied to all additions)	
a. Trails added	
No additions of motorized trails open to AV.	56 total miles of motorized trails open to AV.
No additions of motorized trails open to vehicles < 50”.	0.9 total miles of motorized trails open to vehicles < 50”.
No additions of motorized trails open to MC.	0 total miles of motorized trails open to MC.
b. Roads added	
No additions of roads open to HV.	524 total miles of roads open to HV.
No additions of roads open to AV.	1650 total miles of roads open to AV.
c. Areas added	
No addition of areas	Continues 605,000 acres open to motorized cross-country travel
3. Changes to the NFTS (appropriate season of use applied to all NFTS facilities)	
a. Changes to Vehicle Class	
Roads open to HV: No change from current management.	528 mi roads seasonally open to HV.
Motorized trails open to AV: No change from current management.	56 mi motorized trails seasonally open to AV.
Motorized trails open to vehicles <50”: No change from current management.	0.9 mi motorized trails seasonally open to vehicles < 50”
Roads open to AV: No change from current management.	1650 mi roads seasonally open to AV
Roads open to AV HLO: No change from current management.	0 mi roads open to HV and AV with HLO
b. Changes to Season of Use	
Roads with changes to season of use: No change from current management.	447 mi roads seasonally open 1763 mi roads open year-round 236 mi closed year-round Total = 2447 mi NFTS roads (note: only 472 mi of roads have formal season of use closure, however many are seasonally closed due to snow or lower elevation locked gates)
Motorized trails with change in season of use: No change from current management.	22 mi motorized trails seasonally open 34 miles open year-round 0 miles closed year-round
c. Changes to Closed year-round	
ML 1 roads: No change from current management.	84 mi of ML 1 roads closed year-round 286 mi ML 1 open
ML 2 roads: No change from current management.	137 mi of ML 2 roads closed year-round 1359 mi ML 2 open
ML 3-5 roads: No change from current management.	14 mi ML 3-5 roads closed year-round 527 mi ML 3-5 open

Alternative 1 by Decision Component	Net Result of Alternative 1 to NFTS
d. Other Changes* to NFTS Roads *where changes =changes to ML (which in most cases changes allowed vehicle class). Note: changes to vehicle class are described fully under item 3a. above.	
Other Changes to ML 1 roads: No change from current management	286 mi ML 1 roads open 84 mi ML 1 roads closed
Other Changes to ML 2 roads: No change from current management	1359 mi ML 2 roads open 137 mi ML 2 roads closed
Other Changes to ML 3-5 roads: No change from current management	527 mi ML 3-5 roads open 14 mi ML 3-5 roads closed
4. Non-significant LRMP Amendments	
a. Recreation- ROS Element Map (LRMP S&G # 22) No amendment to the LRMP.	S&G #22 would not be modified. 110,500 acres Semi-Primitive Non-Motorized ROS class
b. Recreation- OHV (LRMP S&G # 17) No amendment to the LRMP.	S&G #17 would not be modified. S&G #17 states : "Open all ML 1 and 2 Roads for OHV use unless designated as closed. <i>Maintenance Level 3, 4 and 5 roads are closed to unlicensed OHV use unless designated as a combined use road.</i> "

Seasons of Use

The season of use for NFTS roads, motorized trail and areas (including parking/staging areas) is based on reduction or avoidance of environmental effects, compliance with the LRMP, and/or administrative needs. Table 2- 2 displays these seasons of use under current management. Appendix A of this FEIS displays seasons of use for NFTS facilities.

Table 2- 2. Alternative 1 – Seasons of Use

Season of Use	Map Identifier	Season of Use	Map Identifier
15-June to 1-October	A	16-June to 30-April	L
1-August to 1-May	aa	30-May to 1-November	ll
1-July to 15-September	bb	1-May to 1-December	M
15-May to 15-September	cc	1-June to 1-November	Mm
1-July to 1-November	D	1-April to 1-January	N
30-November to 1-October	dd	15-July to 1-November	Oo
20-April to 1-October	ee	1-April to 1-December	Qq
1-June to 15-November	F	20-April to 1-December	Rr
21-May to 1-October	ff	30-June to 1-October	S
1-July To 1-October	gg	15-June to 15 September	Ss
20-May to 1-December	H	1-August to 1-July	T
1-July to 15-October	hh	20-April to 1-November	Yyy
15-August to 1-December	I	Closed Year Round	Z
1-February to 1-November	jj		
20-May to 1-November	kk		

2.3.2 Alternative 2 – Proposed Action

Alternative 2 entails the proposed changes to the NFTS and the prohibition of cross-country travel as described in the NOI published September 11, 2007 (Volume 72, Number 175) with some modifications. After further analysis and public input in response to the NOI, discrepancies in the published proposed action were identified. The proposed action has been modified to accurately reflect the proposed changes to the NFTS. These modifications are described below:

- Fourteen (14) NFTS roads were inaccurately inventoried as unauthorized routes. As a result, unauthorized routes: AE-32, KD-220, JH-02x, JH-56, JH-73, KD-19, KD-19a, ML404, SR-82, SR-82b, SV25 and TH-87 have been properly identified by their road number and are included in the NFTS.
- The NOI inaccurately described 6 miles of unauthorized routes as NFTS trail additions. In Alternative 2, they have been accurately described as additions to the NFTS roads.
- Five (5) unauthorized routes, totaling approximately 4 miles, were erroneously included in the proposed action (as published in the NOI). Unauthorized routes SV-4, JM-17z, JM-1y (Westfall analysis unit), TH-47z, (Globe analysis unit) and ES1 (Jose-Chawanakee analysis unit) were removed from the proposed action (Alternative 2) because they were not consistent with the LRMP for watershed or sensitive wildlife habitat reasons (See project record for further detail).
- Route names (e.g. Footman) that were used to identify unauthorized routes in the proposed action were not carried forward, rather, the ID numbers (e.g. TH-25w) were used to track and analyze unauthorized routes in this FEIS. A crosswalk of these route names to their route ID numbers is provided in Appendix L.
- The NOI proposed to convert those primitive rough graded roads known as OHV routes, (e.g. Star Lakes and Coyote, OHV Routes) to NFTS motorized trails. Because conversion of a road to a trail is an administrative action and not subject to NEPA analysis (because the vehicle class type would not change), SNF completed the conversion (by changing the status in the INFRA database) of 56 miles prior to publishing in the FEIS (See Transportation Section 3.2 for list of these).
- The NOI stated that no new roads were proposed to be added to the NFTS. However, because some of the unauthorized routes proposed to be added are more accurately defined as roads, 5 miles proposed to be added as motorized trails are now proposed to be added as roads
- The NOI included a table titled “NFS Roads to be managed as NFS Trails.” In the FEIS these ML 1 roads were addressed in the action “Changes to the NFTS.” Vehicle class would be changed on most of these NFTS roads from closed to all vehicles, to roads or motorized trails open to all vehicles.

Alternative 2 prohibits cross-country travel and proposes adding motorized trails, roads and an area to the NFTS. It proposes to make changes to the NFTS (vehicle class and season of use). Alternative 2 also proposes two non-significant LRMP amendments. The first column of Table 2-3 describes the summary of actions proposed in Alternative 2. The second column describes the resulting changes to the NFTS. Please see Appendix A for specific information on proposed additions and changes to the NFTS by alternative.

Table 2- 3. Alternative 2 – Actions

Notes: Except when x<1: miles and acres rounded to the nearest whole number; AV= all vehicles; HV= highway-legal vehicles only; MC= motorcycles only; ML= maintenance level; AV HLO= highway-legal vehicles and all vehicles with highway licensed operators

Alternative 2 by Decision Component	Net Result of Alternative 2 to NFTS
1. Cross-country travel	
Prohibit motorized cross-country travel. (allows parking one vehicle length off the NFTS unless posted otherwise.)	Motorized cross-country travel is prohibited on the SNF.
2. Additions to the NFTS (appropriate season of use applied to all additions)	
a. Trails added	
16 miles of motorized trails added to the current 56 mi of NFTS motorized trails open to AV (all trail class vehicles).	72 total miles of motorized trails open to AV.
20 miles of motorized trails added to the current 0.9 mi of NFTS motorized trails open to vehicles < 50".	21 total miles of motorized trails open to vehicles < 50".
3 miles of motorized trails added to the current 0 mi of NFTS motorized trails open to MC.	3 total miles of motorized trails open to MC.
b. Roads added	
0 miles of roads added to the current 524 mi of NFTS roads open to HV.	524 total miles of roads open to HV.
5 miles of roads added to the current 1650 NFTS roads open to AV (including trail class vehicles).	1655 total miles of roads open to AV.
c. Areas added	
There is 1 area (6 acres) added to the current 5 NFTS areas (75 acres) open to AV (including trail class vehicles).	6 total areas (81 acres) open to AV.
0 parking/staging areas (0 acres) added to the current 54 NFTS parking/staging areas open HV.	54 total areas (49 acres) open to HV.
3. Changes to the NFTS (appropriate season of use applied to all NFTS facilities)	
a. Changes to Vehicle Class	
Roads open to HV: 12 mi of roads currently open to AV changed to roads open to HV, and 11 mi of HV roads currently closed changed to open to HV.	Due to changes to the NFTS, there are 532 miles of roads open to HV*. (23 mi were changed, 510 mi remained open) * does not include roads added to the NFTS.
Motorized trails open to AV: 3 mi of currently closed (ML 1) or open to AV NFTS roads changed to motorized trails open to AV.	Due to changes to the NFTS, there are 59 miles of motorized trails open to AV*. (3 mi were changed, 56 mi remain open) * does not include motorized trails added to the NFTS.
Motorized trails open to vehicles <50": 0.9 mi of NFTS roads currently open to AV changed to motorized trails open to vehicles < 50".	Due to changes to the NFTS, there are 5 miles of motorized trails open to vehicles < 50". (4 mi were changed) * does not include motorized trails added to the NFTS.

Alternative 2 by Decision Component	Net Result of Alternative 2 to NFTS
<p>Roads open to AV: 12 mi of NFTS roads currently open to HV changed to roads open to AV, and there are 59 mi of NFTS roads currently closed to AV changed to open to AV roads.</p>	<p>Due to changes to the NFTS, there are 1461 miles of roads open to AV. (71 mi were changed, 1331 mi remained open) * does not include roads added to the NFTS.</p>
<p>Roads open to AV HLO: 0 mi of NFTS road segments currently open to HV changed to road segments open to AV HLO.</p>	<p>Due to changes to the NFTS, there are 0 miles of road segments open to AV HLO.</p>
<p>b. Changes to Season of Use</p>	
<p>Roads with changes to season of use: 898 mi of the 2447 mi of NFTS roads have a new or different season of use applied.</p>	<p>Due to changes to season of use on NFTS roads, there are 946 mi seasonally open, 1054 mi open year-round and 446 mi closed year-round for a total* of 2447 miles of NFTS roads. *does not include roads added to the NFTS.</p>
<p>Motorized trails with change in season of use: 21 mi of the current 56 mi of NFTS motorized trails had a new or different season of use applied.</p>	<p>Due to changes to season of use on NFTS motorized trails, there are 39 mi seasonally open, and 17 mi open year-round for a total* of 56 miles of NFTS motorized trails. *does not include trails added to the NFTS.</p>
<p>c. Changes to Closed year-round</p>	
<p>ML 1 roads: Of the current 372 mi ML 1 roads, 71 mi will remain closed and 197 mi will change from open to closed. The remaining ML 1 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>0 mi of ML 1 roads remain open (per FSH 7700.59 62.63)</p>
<p>ML 2 roads: Of the current 1496 mi ML 2 roads, 78 mi will remain closed, 88 mi will change from open to closed, and 59 mi will change from closed to open. Some ML 2 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>1258 mi of ML 2 roads remain open.</p>
<p>ML 3-5 roads: Of the current 541 mi ML 3-5 roads, 2 mi will remain closed, 5 mi will change from open to closed, and 11 mi will change from closed to open. Some ML 3-5 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>510 mi of ML 3-5 roads remain open.</p>
<p>d. Other Changes* to NFTS Roads *where changes =changes to ML (which in most cases changes allowed vehicle class). Note: changes to vehicle class are described fully under item 3a. above.</p>	

Alternative 2 by Decision Component	Net Result of Alternative 2 to NFTS
<p>Other Changes to ML 1 roads:</p> <ul style="list-style-type: none"> • 84 mi of currently closed ML 1 changed to ML 2 open • 13 mi currently open ML 1 changed to ML 2 open • 1 mi currently open ML 1 changed to ML 3-5 open • 1 mi currently open ML 1 changed to motorized trail open to AV • 4 mi currently open ML 1 changed to motorized trail <50" 	<p>See item 3.c. for total ML 1 roads.</p>
<p>Other Changes to ML 2 roads:</p> <ul style="list-style-type: none"> • 84 mi of currently closed ML 1 changed to ML 2 open • 13 mi currently open ML 1 changed to ML 2 open • 11 mi currently open ML 2 changed to ML 3-5 open • 1 mi currently open ML 2 changed to motorized trail open to AV • 12 mi currently open ML 3-5 changed to ML 2 open • 1 mi ML 3-5 closed to ML 2 open 	<p>See item 3.c. for total ML 2 roads.</p>
<p>Other Changes to ML 3-5 roads:</p> <ul style="list-style-type: none"> • 1 mi of currently closed ML 1 changed to ML 3-5 • 11 mi currently open ML 2 changed to ML 3-5 open • 12 mi currently open ML 3-5 changed to ML 2 open • 1 mi currently closed ML 3-5 changed to ML 2 open 	<p>See item 3.c. for total ML 3-5 roads.</p>
<p>4. Non-significant LRMP Amendments</p>	
<p>a. Recreation- ROS Element Map (LRMP S&G # 22) Amend the LRMP to remove 512 acres from the current 110,500 acres of Semi-Primitive Non-Motorized ROS Class, and add 512 acres to the current 60,800 acres of Semi-Primitive Motorized ROS Class on the ROS Element Map.</p>	<p>109,988 acres of Semi-Primitive Non-Motorized ROS Class, and 61,312 acres of Semi-Primitive Motorized ROS Class.</p>
<p>b. Recreation- OHV (LRMP S&G # 17) Amend the LRMP to remove the following sentence: "Open all Maintenance Level 1 and 2 roads for OHV use unless designated closed." and replace with: "Maintenance Level 2-5 roads are open for OHV use where designated on the MVUM." Replace the word "combined" with "mixed" in the following sentence: "Maintenance Level 3, 4, and 5 roads are closed to unlicensed OHV use unless designated as a combined use road."</p>	<p>LRMP S&G #17 would state "... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions."</p>

Seasons of Use

The season of use for NFTS roads, motorized trails and areas (including parking/staging areas) is based on reduction or avoidance of environmental effects, compliance with the LRMP, and/or administrative needs. Table 2- 4 displays these seasons of use. Appendix A of this FEIS displays seasons of use for NFTS facilities.

Table 2- 4. Alternative 2 – Seasons of Use

Season of Use	Map Identifier
15-June to 1-October	A
15-July to 1-October	aaa
30-July to 1-October	B
15-June to 1-November	C
15-April to 1-November	ccc
1-July to 1-November	D
1-July to 15-October	ddd
1-August to 1-November	E
20-May to 15-October	eee
1-June to 15-November	F
1-May to 1-November	fff
20-May to 1-November	ggg
20-May to 1-December	H
July-1 to 15-October	hh
1-June to 1-November	hhh
15-August to 1-December	I
15-July to 1-November	jjj
20-May to 1-November	kk
1-May to 15-November	kkk
15-June to 1-May	L
20-May to 15-November	lll
1-May to 1-December	M

Season of Use	Map Identifier
1-April to 1-January	N
15-June to 15-November	nnn
20-April to 1-December	ppp
1-April to 1-December	qqq
20-April to 1-December	rr
16-June to 1-December	rrr
1-July to 1-December	sss
1-August to 1-July	T
20-April to 12-January	tt
31-July to 1-December	ttt
30-May to 15-September	uu
1-August to 1-December	uuu
20-April to 1-October	vv
30-September to 1-December	vvv
15-May to 1-October	ww
15-July to 15-November	www
20-May to 1-October	x
15-April to 15-December	xxx
20-June to 1-October	z
Closed Year Round	Z

2.3.3 Alternative 3

Alternative 3 responds to issues of impacts to natural and cultural resources and impacts to non-motorized recreational experience by prohibiting motorized cross-country travel without adding additional facilities to the NFTS. Alternative 3 meets the objective of prohibiting cross-country travel. This alternative also provides a baseline for comparing the impacts of other alternatives that propose changes to the NFTS in the form of new facilities.

Alternative 3 prohibits cross-country travel. No additions to the NFTS are proposed. No changes (vehicle class, season of use, changes to closed year-round, and changes to operational ML) would be made to the NFTS. No non-significant LRMP amendments would be made. The first column of Table 2- 5 describes the summary of actions proposed in Alternative 3. The second column describes the resulting changes (if any) to the NFTS. Please see Appendix A for a complete list of roads and comparison of actions by alternative.

Table 2- 5. Alternative 3 – Actions

Notes: Except when $x < 1$: miles and acres rounded to the nearest whole number; AV= all vehicles; HV= highway-legal vehicles only; MC= motorcycles only; ML= maintenance level; AV HLO= highway-legal vehicles and all vehicles with highway licensed operators

Alternative 3 by Decision Component	Net Result of Alternative 3 to NFTS
1. Cross-country travel	
Prohibit motorized cross-country travel. (allows parking one vehicle length off the NFTS unless posted otherwise.)	Motorized cross-country travel is prohibited on the SNF.
2. Additions to the NFTS (appropriate season of use applied to all additions)	
a. Trails added	
No additions	56 total miles of motorized trails open to AV.
No additions	0.9 total miles of motorized trails open to vehicles < 50”.
No additions	0 total miles of motorized trails open to MC.
b. Roads added	
No additions	524 total miles of roads open to HV.
No additions	1650 total miles of roads open to AV.
c. Areas added	
No additions	5 total areas (75 acres) open to AV.
No additions	54 parking/ staging areas (49 acres)
3. Changes to the NFTS (appropriate season of use applied to all NFTS roads and trails)	
a. Changes to Vehicle Class	
Roads open to HV: No change from current management.	528 mi roads seasonally open to HV.
Motorized trails open to AV: No change from current management.	56 mi motorized trails seasonally open to AV.
Motorized trails open to vehicles <50”: No change from current management.	0.9 mi motorized trails seasonally open to vehicles < 50”
Roads open to AV: No change from current management.	1650 mi roads seasonally open to AV
Roads open to AV HLO: No change from current management.	0 mi roads open to HV and AV with HLO
b. Changes to Season of Use	
Roads with changes to season of use: No change from current management.	447 mi roads seasonally open 1763 mi roads open year-round 236 mi closed year-round Total = 2447 mi NFTS roads (note: only 472 mi of roads have formal season of use closure, however many are in effect seasonally closed due to snow or lower elevation locked gates)
Motorized trails with change in season of use: No change from current management.	22 mi motorized trails seasonally open 34 miles open year-round 0 miles closed year-round
c. Changes to Closed year-round	
ML 1 roads: No change from current management.	84 mi of ML 1 roads closed year-round 286 mi ML 1 open
ML 2 roads: No change from current management.	137 mi of ML 2 roads closed year-round 1359 mi ML 2 open
ML 3-5 roads: No change from current management.	14 mi ML 3-5 roads closed year-round 527 mi ML 3-5 open

Alternative 3 by Decision Component	Net Result of Alternative 3 to NFTS
d. Other Changes* to NFTS Roads *where changes =changes to ML (which in most cases changes allowed vehicle class). Note: changes to vehicle class are described fully under item 3a. above.	
Other Changes to ML 1 roads: No change from current management	286 mi ML 1 roads open 84 mi ML 1 roads closed
Other Changes to ML 2 roads: No change from current management	1359 mi ML 2 roads open 137 mi ML 2 roads closed
Other Changes to ML 3-5 roads: No change from current management	527 mi ML 3-5 roads open 14 mi ML 3-5 roads closed
4. Non-significant LRMP Amendments	
a. Recreation- ROS Element Map (LRMP S&G # 22) No amendment to the LRMP	S&G #22 would not be modified. 110,500 acres Semi-Primitive Non-Motorized ROS class
b. Recreation- OHV (LRMP S&G # 17) No amendment to the LRMP	S&G #17 would not be modified.

Seasons of Use

The season of use for NFTS roads, motorized trails and areas (including parking/ staging areas) is based on reduction or avoidance of environmental effects, compliance with the LRMP, and/or administrative needs. Because there is no change from current management in Alternative 3, Table 2- 2 (Alternative 1) displays seasons of use for Alternative 3. Appendix A of this FEIS displays seasons of use for NFTS facilities.

2.3.4 Alternative 4

Alternative 4 responds to issues of impacts to natural and cultural resources and impacts to non-motorized recreational experience by prohibiting motorized cross-country travel and adding motorized trails and roads in locations that avoid or mitigate for sensitive resources. Alternative 4 meets the objective of prohibiting cross-country travel. Seasonal and year-round road closures are applied where needed for resource protection.

Alternative 4 proposes to make changes to the NFTS (vehicle class, season of use, changes to closed year-round, and changes to operational ML). Alternative 4 also proposes two non-significant LRMP amendments. The first column Table 2- 6 describes the summary of actions proposed in Alternative 4. The second column describes the resulting changes to the NFTS. Please see Appendix A for specific information on proposed additions and changes to the NFTS by alternative.

Table 2- 6. Alternative 4 – Actions

Notes: Except when x<1: miles and acres rounded to the nearest whole number; AV= all vehicles; HV= highway-legal vehicles only; MC= motorcycles only; ML= maintenance level; AV HLO= highway-legal vehicles and all vehicles with highway licensed operators

Alternative 4 by Decision Component	Net Result of Alternative 4 to NFTS
1. Cross-country travel	
Prohibit motorized cross-country travel. (allows parking one vehicle length off the NFTS unless posted otherwise.)	Motorized cross-country travel is prohibited on the SNF.
2. Additions to the NFTS (appropriate season of use applied to all additions)	
a. Trails added	
20 miles of motorized trails added to the current 56 mi of NFTS motorized trails open to AV (all trail class vehicles).	76 total miles of motorized trails open to AV.
19 miles of motorized trails added to the current 0.9 mi of NFTS motorized trails open to vehicles < 50".	20 total miles of motorized trails open to vehicles < 50".
3 miles of motorized trails added to the current 0 mi of NFTS motorized trails open to MC.	3 total miles of motorized trails open to MC.
b. Roads added	
0 miles of roads added to the current 524 mi of NFTS roads open to HV.	524 total miles of roads open to HV.
9 miles of roads added to the current 1650 NFTS roads open to AV (including trail class vehicles).	1659 total miles of roads open to AV.
c. Areas added	
5 areas (34 acres) added to the current 5 NFTS areas (75 acres) open to AV (including trail class vehicles).	10 total areas (109 acres) open to AV.
6 parking/staging areas (3 acres) added to the current 54 NFTS parking/staging areas open to HV.	60 total areas (52 acres) open to HV
3. Changes to the NFTS (appropriate season of use applied to all NFTS roads and trails)	
a. Changes to Vehicle Class	
Roads open to HV: 7 mi of roads currently open to AV changed to roads open to HV, and there are 4 mi of HV roads currently closed changed to open to HV.	Due to changes to the NFTS, there are 486 miles of roads open to HV*. (11 mi were changed, 475 mi remained open) * does not include roads added to the NFTS.
Motorized trails open to AV: 2 mi of currently closed (ML 1) or open to AV NFTS roads changed to motorized trails open to AV.	Due to changes to the NFTS, there are 58 miles of motorized trails open to AV*. (2 mi were changed, 56 mi remain open) * does not include motorized trails added to the NFTS.
Motorized trails open to vehicles <50": 7 mi of NFTS roads currently open to AV changed to motorized trails open to vehicles < 50".	Due to changes to the NFTS, there are 8 miles of motorized trails open to vehicles < 50". (7 mi were changed, 1 mi remains open) * does not include motorized trails added to the NFTS.
Roads open to AV: 25 mi of NFTS roads currently open to HV changed to roads open to AV, and there are 60 mi of NFTS roads currently closed AV roads changed to open to AV roads.	Due to changes to the NFTS, there are 1417 miles of roads open to AV*. (85 mi were changed, 1272 mi remained open) * does not include roads added to the NFTS.

Alternative 4 by Decision Component	Net Result of Alternative 4 to NFTS
<p>Roads open to AV HLO: 0 mi of NFTS road segments currently open to HV changed to road segments open to AV HLO.</p>	<p>Due to changes to the NFTS, there are 0 miles of road segments open to AV HLO. (0 mi were changed)</p>
<p>b. Changes to Season of Use</p>	
<p>Roads with changes to season of use: 1742 mi of the 2447 mi of NFTS roads have a new or different season of use applied.</p>	<p>Due to changes to season of use on NFTS roads, there are 1512 mi seasonally open, 383 mi open year-round and 552 mi closed year-round for a total* of 2447 miles of NFTS roads. *does not include roads added to the NFTS.</p>
<p>Motorized trails with change in season of use: 43 mi of the current 56 mi of NFTS motorized trails had a new or different season of use applied.</p>	<p>Due to changes to season of use on NFTS motorized trails, there are 55 mi seasonally open, and 1 mi open year-round for a total* of 56 miles of NFTS motorized trails. *does not include trails added to the NFTS.</p>
<p>c. Changes to Closed year-round</p>	
<p>ML 1 roads: Of the current 372 mi ML 1 roads, 73 mi will remain closed and 241 mi will change from open to closed. The remaining ML 1 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>0 mi of ML 1 roads remain open (per FSH 7700.59 62.63)</p>
<p>ML 2 roads: Of the current 1496 mi ML 2 roads, 76 mi will remain closed, 129 mi will change from open to closed, and 61 mi will change from closed to open. Some ML 2 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>1221 mi of ML 2 roads remain open.</p>
<p>ML 3-5 roads: Of the current 541 mi ML 3-5 roads, 10 mi will remain closed, 28 mi will change from open to closed, and 4 mi will change from closed to open. Some ML 3-5 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>475 mi of ML 3-5 roads remain open.</p>
<p>d. Other Changes* to NFTS Roads *where changes =changes to ML (which in most cases changes allowed vehicle class). Note: changes to vehicle class are described fully under item 3a. above.</p>	

Alternative 4 by Decision Component	Net Result of Alternative 4 to NFTS
<p>Other Changes to ML 1 roads:</p> <ul style="list-style-type: none"> • 11 mi of currently closed ML 1 changed to ML 2 open • 39 mi currently open ML 1 changed to ML 2 open • 0 mi currently open ML 1 changed to ML 3-5 open • 0.5 mi currently open ML 1 changed to motorized trail open to AV • 7 mi currently open ML 1 changed to motorized trail <50" 	<p>See item 3.c. for total ML 1 roads.</p>
<p>Other Changes to ML 2 roads:</p> <ul style="list-style-type: none"> • 39 mi of currently closed ML 1 changed to ML 2 open • 11 mi currently open ML 1 changed to ML 2 open • 7 mi currently open ML 2 changed to ML 3-5 open • 1 mi currently open ML 2 changed to motorized trail open to AV • 25 mi currently open ML 3-5 changed to ML 2 open 	<p>See item 3.c. for total ML 2 roads.</p>
<p>Other Changes to ML 3-5 roads:</p> <ul style="list-style-type: none"> • 0 mi of currently closed ML 1 changed to ML 3-5 • 7 mi currently open ML 2 changed to ML 3-5 open • 24 mi currently open ML 3-5 changed to ML 2 open • 0 mi currently closed ML 3-5 changed to ML 2 open 	<p>See item 3.c. for total ML 3-5 roads.</p>
<p>4. Non-significant LRMP Amendments</p>	
<p>a. Recreation- ROS Element Map (LRMP S&G # 22) Amend the LRMP to remove 1,074 acres from the current 110,500 acres of Semi-Primitive Non-Motorized ROS Class, and add 1,074 acres to the current 60,800 acres of Semi-Primitive Motorized ROS Class on the ROS Element Map.</p>	<p>109,426 acres of Semi-Primitive Non-Motorized ROS Class, and 61,874 acres of Semi-Primitive Motorized ROS Class.</p>
<p>b. Recreation- OHV (LRMP S&G # 17) Amend the LRMP to remove the following sentence: "Open all Maintenance Level 1 and 2 roads for OHV use unless designated closed." and replace with: "Maintenance Level 2-5 roads are open for OHV use where designated on the MVUM." Replace the word "combined" with "mixed" in the following sentence: "Maintenance Level 3, 4, and 5 roads are closed to unlicensed OHV use unless designated as a combined use road."</p>	<p>LRMP S&G 17 would state "... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions."</p>

Seasons of Use

The season of use for NFTS roads, motorized trails and areas (including parking/staging areas) is based on reduction or avoidance of environmental effects, compliance with the LRMP, and/or administrative needs. Table 2- 7 displays these seasons of use. Appendix A of this FEIS displays seasons of use for NFTS facilities.

Table 2- 7. Alternative 4 – Seasons of Use

Season of Use	Map Identifier	Season of Use	Map Identifier
15-June to 1-October	A	1-May to 15-December	K
30-July to 1-October	B	15-June to 1-May	L
15-June to 1-November	C	1-May to 1-December	M
1-July to 1-November	D	1-April to 1-January	N
1-August to 1-November	E	20-May to 1-April	R
30-May to 15-November	F	30-June to 1-October	S
20-May to 1-December	H	1-August to 1-July	T
15-August to 1-December	I	Closed Year Round	Z

2.3.5 Alternative 5

Alternative 5 responds to issues of impacts to motorized access and motorized use and ownership conflicts. This alternative prohibits cross-country travel and adds facilities (roads/trails areas) to the NFTS to provide access and recreation opportunity. Alternative 5 meets the objective of prohibiting cross-country travel. Seasonal and year-round road closures are applied where needed for resource protection.

Alternative 5 proposes to make changes to the NFTS (vehicle class, season of use, changes to closed year-round, and changes to operational ML). Alternative 5 also proposes two non-significant LRMP amendments. The first column of Table 2- 8 displays a summary of actions proposed in Alternative 5. The second column describes the resulting changes to the NFTS. Please see Appendix A for specific information on proposed additions and changes to the NFTS by alternative.

Table 2- 8. Alternative 5 – Actions

Notes: Except when x<1: miles and acres rounded to the nearest whole number; AV= all vehicles; HV= highway-legal vehicles only; MC= motorcycles only; ML= maintenance level; AV HLO= highway-legal vehicles and all vehicles with highway licensed operators

Alternative 5 by Decision Component	Net Result of Alternative 5 to NFTS
1. Cross-country travel	
Prohibit motorized cross-country travel. (allows parking one vehicle length off the NFTS unless posted otherwise.)	Motorized cross-country travel is prohibited on the SNF.
2. Additions to the NFTS (appropriate season of use applied to all additions)	
a. Trails added	
32 miles of motorized trails added to the current 56 mi of NFTS motorized trails open to AV (all trail class vehicles).	88 total miles of motorized trails open to AV.
32 miles of motorized trails added to the current 0.9 mi of NFTS motorized trails open to vehicles < 50".	33 total miles of motorized trails open to vehicles < 50".
6 miles of motorized trails added to the current 0 mi of NFTS motorized trails open to MC.	6 total miles of motorized trails open to MC.
b. Roads added	
0 miles of roads added to the current 524 mi of NFTS roads open to HV.	524 total miles of roads open to HV.
15 miles of roads added to the current 1650 NFTS roads open to AV (including trail class vehicles).	1665 total miles of roads open to AV.
c. Areas added	
10 areas (98 acres) added to the current 5 NFTS areas (75 acres) open AV (including trail class vehicles).	15 total areas (173 acres) open to AV.
10 parking/staging areas (7 acres) added to the current 54 NFTS parking/staging areas open HV.	64 total areas (49 acres) open to HV.
3. Changes to the NFTS (appropriate season of use applied to all NFTS roads and trails)	
a. Changes to Vehicle Class	
Roads open to HV: 7 mi of roads currently open to AV changed to roads open to HV, and 4 mi of HV roads currently closed changed to open to HV.	Due to changes to the NFTS, there are 375 miles of roads open to HV*. (11 mi were changed, 386 mi remained open) * does not include roads added to the NFTS.
Motorized trails open to AV: 5 mi of currently closed (ML 1) or open to AV NFTS roads changed to motorized trails open to AV.	Due to changes to the NFTS, there are 61 miles of motorized trails open to AV*. (5 mi were changed, 56 mi remain open) * does not include motorized trails added to the NFTS.
Motorized trails open to vehicles <50": 7 mi of NFTS roads currently open to AV changed to motorized trails open to vehicles < 50".	Due to changes to the NFTS, there are 8 miles of motorized trails open to vehicles < 50". (7 mi were changed, 1 mi remains open) * does not include motorized trails added to the NFTS.

Alternative 5 by Decision Component	Net Result of Alternative 5 to NFTS
<p>Roads open to AV: 154 mi of NFTS roads currently open to HV changed to roads open to AV, and 60 mi of NFTS roads currently closed AV roads changed to open to AV roads.</p>	<p>Due to changes to the NFTS, there are 1676 miles of roads open to AV*. (214 mi were changed, 1402 mi remained open) * does not include roads added to the NFTS.</p>
<p>Roads open to AV HLO: 22 mi of NFTS road segments currently open to HV changed to road segments open to AV HLO.</p>	<p>Due to changes to the NFTS, there are 22 miles of road segments open to AV HLO. (22 mi were changed)</p>
<p>b. Changes to Season of Use</p>	
<p>Roads with changes to season of use: 1688 mi of the 2447 mi of NFTS roads have a new or different season of use applied.</p>	<p>Due to changes to season of use on NFTS roads, there are 1569 mi seasonally open, 460 mi open year-round and 418 mi closed year-round for a total* of 2447 miles of NFTS roads. *does not include roads added to the NFTS.</p>
<p>Motorized trails with change in season of use: 43 mi of the current 56 mi of NFTS motorized trails had a new or different season of use applied.</p>	<p>Due to changes to season of use on NFTS motorized trails, there are 55 mi seasonally open, and 1 mi open year-round for a total* of 56 miles of NFTS motorized trails. *does not include trails added to the NFTS.</p>
<p>c. Changes to Closed year-round</p>	
<p>ML 1 roads: Of the current 372 mi ML 1 roads, 60 mi will remain closed and 123 mi will change from open to closed. The remaining ML 1 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>0 mi of ML 1 roads remain open (per FSH 7700.59 62.63)</p>
<p>ML 2 roads: Of the current 1496 mi ML 2 roads, 76 mi will remain closed, 127 mi will change from open to closed, and 61 mi will change from closed to open. Some ML 2 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>1220 mi of ML 2 roads remain open.</p>
<p>ML 3-5 roads: Of the current 541 mi ML 3-5 roads, 10 mi will remain closed, 28 mi will change from open to closed, and 4 mi will change from closed to open. Some ML 3-5 roads are changed to a different ML and/or vehicle class (see item 3.d.).</p>	<p>476 mi of ML 3-5 roads remain open.</p>
<p>d. Other Changes* to NFTS Roads *where changes =changes to ML (which in most cases changes allowed vehicle class). Note: changes to vehicle class are described fully under item 3.a. above.</p>	

Alternative 5 by Decision Component	Net Result of Alternative 5 to NFTS
<p>Other Changes to ML 1 roads:</p> <ul style="list-style-type: none"> • 25 mi of currently closed ML 1 changed to ML 2 open • 156 mi currently open ML 1 changed to ML 2 open • 0 mi currently open ML 1 changed to ML 3-5 open • 0.5 mi currently open ML 1 changed to motorized trail open to AV • 8 mi currently open ML 1 changed to motorized trail <50" 	<p>See item 3.c. for total ML 1 roads.</p>
<p>Other Changes to ML 2 roads:</p> <ul style="list-style-type: none"> • 156 mi of currently closed ML 1 changed to ML 2 open • 25 mi currently open ML 1 changed to ML 2 open • 7 mi currently open ML 2 changed to ML 3-5 open • 4 mi currently open ML 2 changed to motorized trail open to AV • 24 mi currently open ML 3-5 changed to ML 2 open 	<p>See item 3.c. for total ML 2 roads.</p>
<p>Other Changes to ML 3-5 roads:</p> <ul style="list-style-type: none"> • 0 mi of currently closed ML 1 changed to ML 3-5 • 7 mi currently open ML 2 changed to ML 3-5 open • 24 mi currently open ML 3-5 changed to ML 2 open • 0 mi currently closed ML 3-5 changed to ML 2 open 	<p>See item 3.c. for total ML 3-5 roads.</p>
<p>4. Non-significant LRMP Amendments</p>	
<p>a. Recreation- ROS Element Map (LRMP S&G # 22) Amend the LRMP to remove 1,074 acres from the current 110,500 acres of Semi-Primitive Non-Motorized ROS Class, and add 1,074 acres to the current 60,800 acres of Semi-Primitive Motorized ROS Class on the ROS Element Map.</p>	<p>109,426 acres of Semi-Primitive Non-Motorized ROS Class, and 61,874 acres of Semi-Primitive Motorized ROS Class.</p>
<p>b. Recreation- OHV (LRMP S&G # 17) Amend the LRMP to remove the following sentence: "Open all Maintenance Level 1 and 2 roads for OHV use unless designated closed." and replace with: "Maintenance Level 2-5 roads are open for OHV use where designated on the MVUM." Replace the word "combined" with "mixed" in the following sentence: "Maintenance Level 3, 4, and 5 roads are closed to unlicensed OHV use unless designated as a combined use road."</p>	<p>LRMP S&G 17 would state "... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions. "</p>

Seasons of Use

The season of use for NFTS roads, motorized trails and areas (including parking/staging areas) is based on reduction or avoidance of environmental effects, compliance with the LRMP, and/or administrative needs. Table 2- 9 displays these seasons of use. Appendix A of this FEIS displays seasons of use for NFTS facilities.

Table 2- 9. Alternative 5 – Seasons of Use

Season of Use	Map Identifier	Season of Use	Map Identifier
15-June to 1-October	A	1-May to 15-December	K
30-July to 1-October	B	15-June to 1-May	L
15-June to 1-November	C	1-May to 1-December	M
1-July to 1-November	D	1-April to 1-January	N
1-August to 1-November	E	15-August to 1-January	O
30-May to 15-November	F	20-May to 1-April	R
20-May to 1-December	H	30-June to 1-October	S
15-August to 1-December	I	1-August to 1-July	T
1-September to 1-December	J	Closed Year Round	Z

2.3.6 Common to Alternatives 2, 4, and 5

Design Features, Mitigation Measures, and Preventative Measures

Site specific analysis identified the natural or cultural resource issues or concerns that drove application of mitigation measures (MM), design features (DF), and preventative measures (PM).

DFs are a prescriptive action needed to minimize, reduce or eliminate impacts on sensitive resources. They are incorporated as an integrated part of the action alternatives. A DF is an “action required prior to opening” and is required to be completed prior to designation on the MVUM.

MMs are a prescriptive action needed to minimize, reduce or eliminate impacts on sensitive resources and address specific policy or law requirements. They are incorporated as an integrated part of the action alternatives. MM is an “action required prior to opening” and is required to be completed prior to designation on the MVUM.

PMs are a prescriptive action needed to avoid causing an unacceptable resource affect. A PM is not an “action required prior to opening” and is not required to be completed prior to designation on the MVUM.

- These have been analyzed for their potential to reduce or eliminate effects on environmental resource issues associated with motor vehicle travel. These effects are disclosed in the resource sections of Chapter 3. All action alternatives incorporate prescriptive actions.
- Appendix A identifies which of these preventative measures (may be one or more) apply site-specifically to proposed additions to NFTS.

The following table (Table 2- 10) describes the prescriptive actions common to all alternatives.

Table 2- 10. Prescriptive Actions Common to all Alternatives

Prescriptive Action	Description of Prescriptive Action
Grade road/trail	Grading using mechanized equipment during period with adequate soil moisture to achieve compaction.
Construct, drainage feature	Construct waterbars, ditches, cross drains, dips, out sloping, or other water diversion feature designed to prevent water from flowing along the tread and causing erosion. Space drainage features for appropriate gradient and soils. Reference: LRMP S&G 128, Erosion Control Treatment Selection Guide. 0677 1203P; Reference: Riparian Restoration: Roads Field Guide. 0577 1801P
Repair drainage feature	Repair waterbars, ditches, cross drains, dips, out sloping, or other water diversion feature designed to prevent water from flowing along the tread and causing erosion. Space drainage features for appropriate gradient and soils. Reference: LRMP S&G 128, Erosion Control Treatment Selection Guide. 0677 1203P; Reference: Riparian Restoration: Roads Field Guide. 0577 1801P
Armor road/trail drainage features	Add rock or other armoring to protect ditches, cross drains, dips, etc from erosion (due to steep slopes and/or fine-textured soils).
Install energy dissipaters at drainage structure outlets	Provide sediment filter/energy dissipater using hand work by placing slash or rip-rap at outlets of over side drains, dips, or relief ditches.
Stabilization of sections of trail tread	Construct a causeway by reshaping tread and capping with rock (use geotextile, if needed). Reference: Managing Degraded Off-Highway Vehicle Trails in Wet, Unstable, and Sensitive Environments 0223–2821–MTDC
Gully and rutting repairs	Reconstruct or repair severely eroded road or trail tread and downslope erosion features by filling, reshaping, vegetating/mulching if necessary, and providing for adequate drainage to minimize future erosion. Fill gullies and ruts, including use of ¾ crushed base rock and compact Use of mechanized equipment during period with adequate soil moisture to achieve compaction.
Minor realignment	Avoid a resource concern by rerouting the road or trail within 15 meters (49 feet) of current alignment. Resource specialists will be consulted to confirm that implementation is consistent with all requirements specified in this analysis.
Pad travel way	Install rock (or other approved material) padding with separation fabric. Typically for protecting cultural resources.
Install stream crossing structure	Install crossing structure (bridge, bottomless arch, single or multiple culverts) that provides for proper channel function and passage of flow and aquatic organisms. Use of mechanized equipment is probable. Consult with District Hydrologist and Aquatic Species Biologist to ensure that implementation achieves these objectives.
Install stream ford crossing	Install a low water crossing (such as armoring with rock) that provides proper channel function and passage of flow and aquatic organisms. Consult with District Hydrologist and Aquatic Species Biologist to ensure that implementation achieves these objectives.
Repair stream crossing structure	Repair culvert, bridge/elevated crossing, arch pipe, low water crossing, high water crossing or other stream channel crossing structure. Work may be accomplished by hand or with equipment, as specified.

Prescriptive Action	Description of Prescriptive Action
Armor approaches to stream crossing	Install hardened surface (e.g. place rocks, cobbles and/or gravels; geoweb structure, concrete block pavers, compacted road base, etc) on approaches to stream channel crossing. Material will not be placed within the floodplain. Use of heavy equipment is probable. Consult with District Hydrologist or Forest Soils Program Manager to ensure that implementation achieves objectives.
Remove fill from stream channel	Remove fill previously placed in stream channel and redistribute on trail tread outside of channel, in order to provide for proper stream channel function (stream width/depth). Consult with District Hydrologist to ensure that implementation achieves this objective.
Weed treatment, eradicate weeds	Using manual (no herbicide) treatment of population for a specified period of time, depending on species.
Brushing	Reduce roadside or trailside brush to facilitate vehicle passage or to improve treadway or sight distance
Remove downed trees from travel way	Use of chainsaw to remove log from travel way; sections or entire log may be used as barrier if needed.
Remove barrier	Remove obstacles (large boulders or other obstacles) blocking route to prevent resource damage.
Delineating boundaries for Open Areas and parking facilities	Reference: Using Landscape Timbers to Mark Unpaved Parking Areas, T&D News: Winter 2002. 0271 2806
Install barrier	Large boulders or other imported material, placed in close proximity to road or designated route prism, designed to keep vehicle traffic on designated travel way. Reference: Vehicle Barriers: Their Use and Planning Considerations. 0623 1201P
Install gate	Install gate in order to control traffic use on the road or trail. Reference: Vehicle Barriers: Their Use and Planning Considerations. 0623 1201P
Install signs	Placement of one of a variety of educational and enforcement signs, aimed at limiting off-route travel, parking or other activities that could otherwise affect Forest resources. Reference: Revised Forest Service Guidelines for OHV Travel-Management Signs. 0623 2317; Sign Installation Guide 0371-2812-MTDC
Implement an existing project, as specified	An existing project, independent of this EIS and decision, will address identified needs for road/trail. (Described in the Implementation Guidelines). Although independent, these projects are tracked here because they meet a need identified during this analysis and must be implemented prior to the route being available for public use.

Implementation of Prescriptive Actions

Priority scheduling of prescriptive actions is based on the following considerations:

1. Roads and trails that provide connectivity and important access for the transportation network or provide key public benefit and opportunities.
2. Roads and trails where the location or deteriorated condition is causing substantial effects to riparian, watershed, threatened, endangered or sensitive species, or significant cultural resources.
3. Prescriptive actions requiring relatively low-cost, easily implemented work (such as signage or simple barriers).

2.3.7 Monitoring

Monitoring is critical for evaluating the effectiveness of management decisions and the accuracy of analysis assumptions and conclusions. Monitoring of road, motorized trail and area (Open Areas, parking and staging areas) conditions is required and must meet regional and/or National standards as described in the LRMP and Forest Service policy. If monitoring determines additional resource damage is occurring, steps to prevent further damage must be taken. If the mitigation measures are not effective or are not possible, road or trail closures may be required and may require additional NEPA analysis. Monitoring requires establishment of a condition baseline prior to project implementation and gathers data for future management decisions. Below is a general description of the types of monitoring applied to proposed NFTS facilities.

Aquatic Wildlife: Monitoring for effectiveness of prescriptive actions for NFTS additions within USDI Fish and Wildlife Threatened (T), Endangered (E), Candidate (C) or Forest Service Sensitive (S) aquatic species occupied habitat. These habitats include stream, spring, meadow, riparian, and other sensitive habitats (see Aquatic Biota, Chapter 3). These habitats have the greatest potential for adverse effects to aquatic/riparian species from motor vehicle travel.

Some monitoring and design measures have been identified in the Soils and Water Resources sections that address potential risk to aquatic/riparian species occupied and suitable habitat from erosion, unstable stream channel crossings, and other physical hydrologic effects to aquatic/riparian habitat from motor vehicle use. Additional aquatic/riparian species monitoring would be identified if negative impacts are documented and prescriptive actions do not provide adequate protection to TES species or habitat, or if additional protection measures need to be included for LRMP, Federal, or State management direction consistency. If negative impacts are documented, appropriate mitigation measures would be developed and implemented to reduce or eliminate these impacts, and may require additional NEPA.

Monitoring of NFTS facilities may vary from year to year, and may coincide with monitoring requirements in the LRMP or with State funded OHV (off-highway vehicle) grants.

Botanical Resources - Sensitive Plants: Monitoring would occur along proposed additions to the NFTS identified as a high risk to sensitive plants (see Chapter 3 and Biological Evaluation in the project record). These areas have the greatest potential for adverse effects. Sites monitored may vary from year to year. If negative impacts are documented, appropriate mitigation measures would be developed and implemented. Impacts to plants will be measured in at least two ways, with the first being an observable reduction in plant health or numbers that can be derived from motor vehicle use. If reductions in health or numbers continue to occur for more than one year, then that triggers a review by SNF botanists and appropriate resource personnel for actions to be taken. The second metric will be the presence/absence of noxious weed species within 100 ft of the plant occurrence where there was none before. This presence/absence metric can also trigger a

review of the route or area by appropriate personnel. Another method that may be utilized is the observation of impacts to potential habitat for said plant species, as this diminishes the possibility of population expansion. Monitoring for sensitive plant species in the selected alternative will be done using historical survey data combined with current surveys and photo records.

Cultural Resources: All of the at-risk cultural sites in the area of potential effect of proposed additions to the NFTS were monitored to determine their current condition and risk of adverse effects (see Chapter 3 and the Archaeological Reconnaissance Reports in the project record). In addition to the specific application of monitoring (Appendix B), the Forest Service Policy for Section 106 of the NHPA Compliance in Travel Management: Designated Routes for Motor Vehicle Use (USDA-FS, 2005) requires the development and implementation of a monitoring plan within one year of route designation. This plan would include monitoring of all at-risk historic properties, including those where monitoring was prescribed and a percentage of other historic properties within the NFTS.

Noxious Weeds: Monitoring would occur on proposed additions to the NFTS identified as vulnerable to noxious weed spread (see Chapter 3) per the LRMP, as amended by the 2004 Sierra Nevada Forest Plan Amendment. These areas have the greatest potential for adverse effects. Sites monitored may vary from year to year. If negative impacts are documented, appropriate mitigation measures would be developed and implemented.

Road and Trail Conditions: Roads needing maintenance are identified by SNF staff and the public, and are then prioritized on the annual road maintenance plan. Trails may be monitored by both SNF employees and public volunteers in partnership with the SNF to document trail conditions, based on field observations and measurements. Information derived from this monitoring is used to update the maintenance schedule and assist in prioritizing maintenance needs.

Soil and Water Resources: The implementation and effectiveness of the specified prescriptive actions will be monitored using the USFS Pacific Southwest Region Best Management Practices Evaluation Program (BMPEP) protocols at randomly selected sites. In addition to randomly selected locations, monitoring will be conducted along proposed additions to the NFTS identified as a potentially higher risk for erosion due to increased motorized use after designation (see Appendix B). This monitoring will determine whether there is a need for additional BMPs to protect soil and watershed resources in the long term. The BMPEP protocols and California State OHV Commission Green-Yellow-Red monitoring protocol would be used to evaluate whether these trails are impacting soil or water resources. These evaluations were developed to monitor the condition and drainage features of road surfaces and road/stream crossings. Appropriate mitigation measures derived from monitoring results would be developed and implemented as needed and may require additional NEPA.

Terrestrial Wildlife: Monitoring would occur along proposed additions to the NFTS identified as at risk of noise disturbance to specific wildlife species (see Chapter 3). Sites monitored may vary from year to year and may coincide with monitoring of species populations under the conditions of the LRMP. If negative impacts are documented, appropriate mitigation measures would be developed and implemented.

Site specific monitoring requirements identified for proposed additions to the NFTS are described in Appendix B: Monitoring. Once implementation begins, more effective monitoring elements may be identified and implemented.

Trail and Road Maintenance

Trail and road maintenance standards are described in Forest Service Policy documents. National quality standards for trails can be found in the Forest Service Handbook (FSH) 2309.18, section 15 and referenced in the Forest Service Manual (FSM) 2353.15. Road maintenance standards can be found in FSM 7730 and FSH 7709.58. Trail standards are fully described in Appendix G.

Trail Maintenance Expectations

Several different types of equipment or methods could be employed to accomplish maintenance, including, but not limited to: trail tractor, installation of hardened surfaces, chainsaw and shovel work. A summary of the particular trail maintenance expectations for proposed trails in the project area are:

- Inspections and trail condition surveys to determine specific maintenance needs.
- Clearing vegetation to appropriate width for vehicle type. This practice provides for safety to the user and protects the tread and adjacent resources by discouraging unauthorized routes created around vegetation blocking the trail (e.g. downed tree).
- Reconstruction or rehabilitation of improvements (e.g. drainage structures, hardened tread, cribwalls or bridges) to protect the trail tread and the adjacent resources (e.g. cultural resources) or functions (e.g. stream channel).
- Installation of items such as barriers, directional and informational signing to delineate the trail where needed for user safety, prevention of expansion of trail tread and/or resource protection.
- Stabilize tread to allow for steep gradient (within trail standards per FSM) by installing improvements (e.g. block, geotech materials, etc).
- Minor realignment within 49 feet (15 meters) of existing centerline to allow for steep gradient (within trail standards per FSM).

Road Maintenance Expectations

The SNF operates and maintains NFTS roads in a manner that meets road management objectives (RMOs) and provides for:

1. Safe and efficient travel;
2. Access for the administration, utilization and protection of NFS lands; and
3. Protection of the environment, adjacent resources and public investment.

RMOs are the compilation of the intent for a particular road resulting from all management decisions and operation requirement to meet those decisions. This information includes the description of the road, intended uses, physical requirements necessary to meet those uses, maintenance level and the specific operating periods for the road.

Roads are assigned a ML from 1 through 5 and are generally described as:

ML 1 roads are closed year-round to all traffic and only open during a specific project. The only maintenance expected is to preserve the road investment and minimize adverse resource affects.

ML 2 roads are open to use by high clearance vehicles. Passenger cars are allowed, but that use is not a maintenance consideration.

ML 3 roads are open and maintained for travel by a prudent driver in a standard passenger car. Comfort and convenience is not a consideration. They must meet the Highway Safety Act standards.

ML 4 roads are open and maintained for travel by standard passenger cars and provide a moderate degree of user comfort and convenience. They must meet the Highway Safety Act standards.

ML 5 roads are open and maintained for passenger cars and provide high degree of user comfort, convenience and mobility. They must meet the Highway Safety Act standards.

A full description of these road MLs may be found in Appendix I.

Annually, the SNF develops a road maintenance plan to prioritize road maintenance activities within the current funding resources and needs of the SNF. Typically, roads required to meet the Highway Safety Act (ML 3 thru ML 5) are the higher priorities for attention.

Applying Maintenance Standards

Typically, NFTS roads converted to trails, as well as unauthorized routes added to the NFTS as trails, already have characteristics and conditions that match with the vehicle class specified. This includes width, roughness and experiential attributes. Designation as a motorized trail will ensure that future management and maintenance actions will maintain desired trail characteristics over time.

In very few circumstances, (where unauthorized routes are added to enhance the recreation experience in response to public comments) characteristics of some proposed additions to the NFTS may need to be modified over time to match the specified vehicle class. The approach to management for development of trail characteristics generally includes signage and enforcement for the appropriate vehicle type, while allowing use and natural conditions to define the trail characteristics over time. Future management, if necessary, may include barriers to restrict the width of vehicles using a trail or changing the tread surface conditions to limit use to the appropriate trail vehicle. If future management proposes ground disturbing activities, appropriate site specific analysis will be conducted.

2.4 Part 3 – Alternatives Considered but Eliminated from Detailed Analysis

NEPA requires that Federal agencies rigorously explore and objectively evaluate all reasonable alternatives and briefly discuss the reasons for eliminating any alternatives or components of an alternative that were not developed in detail (40 CFR 1502.14). Based on NEPA case law, alternatives can be eliminated if the proposed alternative 1) does not achieve the purpose and need; 2) has substantially similar consequences as alternatives considered in detail; 3) is not significantly distinguishable from alternatives already being considered; 4) is infeasible; 5) is ineffective; 6) is inconsistent with basic policy objectives for the action; or 7) if the existing range of alternatives sets forth alternatives necessary to permit a reasoned choice.

Public comments and internal scoping that suggested alternatives or components of an alternative be considered but were subsequently eliminated from detailed study are described below. The explanation for the elimination of the alternative from further full analysis is also included.

Designate all Inventoried Unauthorized Routes

This alternative proposed to designate, at a minimum, all of the unauthorized routes receiving current OHV use. In some cases commenters limited the designation to those routes that were not causing a “considerable adverse affect.” Others felt that the SNF should designate a minimum of 280 miles out of the 550 miles inventoried. Along the same lines, other commenters felt that the SNF should designate all existing routes including logging roads. Another similar proposal requested designation of the maximum number of historic unauthorized routes and re-open old existing trails that connect to worthwhile destinations.

Rationale for elimination: Alternative 5 maximizes route additions that meet the purpose and need of the action placing particular emphasis on routes which provide access to key destinations, loops and connectors which provide longer riding time; routes which increase the diversity of opportunities for different vehicle classes (ATVs, motorcycles, full-size four-wheel drive); and routes that provide semi-primitive riding experiences. An intended purpose and need of the action is to comply with the Travel Management Rule. The 2005 Travel Management Rule, 36 CFR Section 212, Subpart B, requires designation after consideration of the route’s effects on National Forest System natural and cultural resources, public safety, provision of recreational opportunities, access needs, conflicts among uses of NFS lands, the need for maintenance and administration of facilities and the availability of resources for that maintenance and administration.

This alternative was eliminated from further consideration as it required routes to be added to the NFTS that; 1) would have environmental effects beyond those considered acceptable given law, policy, and regulations guiding management of the SNF (i.e. designation would cause resource damage beyond that which was feasible to mitigate); 2) would result in a motorized trail system that would not be fiscally feasible to maintain given current and projected financial considerations; 3) are not worthwhile recreational experiences and would not meet the purpose of providing a diversity of motorized recreation opportunities or access to dispersed recreation opportunities; and 4) are inconsistent with basic policy objectives for the action as described in the prior paragraph.

Although the adjustment of this alternative to designate all routes currently used by OHV unless they cause “considerable effect” and maximize mitigation instead of closing routes may resolve the resource impacts concern, the budgetary constraints and lack of recreation experience values remain issues resulting in elimination of this alternative as explained above.

Identify “Event Only” Routes and OHV Special use Permit Areas

This alternative suggested that the SNF only designate those routes open for events under the special use permit process.

Rationale for elimination: Identification of “event only” routes and special use permit areas is outside the scope of this analysis. Motor vehicle use off designated facilities may be authorized by a contract, easement, special use permit or other written authorization issued under Federal law or regulation (36 CFR 212.51(a)(8); FSM 7716.2). Proposals for OHV events on or off designated routes are authorized under special use permits that are considered separately based on the full scope of the proposal. Requests for special use authorizations are considered and analyzed consistent with Forest Service policy and the NEPA under documents which analyze the specifics of the request.

Decommission NFTS Roads to Reduce Resource Impacts

This alternative proposed that the SNF decommission existing NFTS roads where unacceptable environmental effects are occurring including 502 miles of native surfaced NFTS roads with severe resource damage.

Rationale for elimination: The suggested alternative was eliminated from detailed study because it would not meet the purpose and need as described in Chapter 1. Decommissioning is the act of restoring (i.e. ripping, revegetation, physical closure) a road or trail back to natural conditions. Restoration work, including road decommissioning, erosion control, fuel treatment, stream restoration, etc. are prioritized on a landscape basis depending on available funding and personnel. Decommissioning NFTS roads is outside the scope of the purpose and need for this EIS.

Alternative to Allow Cross-Country Travel for Wood Cutting Permittees and Licensed Hunters

This alternative proposed that wood cutting permittees and licensed hunters be allowed to travel cross-country.

Rationale for elimination: This alternative was not analyzed in detail because wood cutting permittees may cut wood in locations as designated by their permit. As wood cutting is done under a special use permit this permit will specify requirements for cross-country travel and therefore the cross-country travel is not “unmanaged.” Regulation of unmanaged cross-country travel is one aspect of the (consistency with) Travel Management Rule and therefore wood cutting is outside of the purpose and need of this document.

Licensed hunters would need to follow the regulations for cross-county travel. The variation in the alternatives already considered would provide a range of motorized hunting opportunities. Therefore this proposal has substantially similar consequences as alternatives considered in detail; is not significantly distinguishable from alternatives already being considered; and the existing range of alternatives sets forth alternatives necessary to permit a reasoned choice.

Routes Considered in Previous NEPA Decisions

This alternative proposed that the SNF only consider designation of routes that have been previously analyzed under prior NEPA documents.

Rationale for elimination: This alternative would limit the inclusion of routes to a very few similar to Alternative 3. It was not analyzed in detail because it; 1) has substantially similar consequences as alternatives considered in detail; 2) is not significantly distinguishable from alternatives already being considered; and 3) the existing range of alternatives sets forth alternatives necessary to permit a reasoned choice.

Add Eleven Routes that Interconnect Existing Miles of Motorized Trails

This alternative proposed that the SNF include eleven specific routes that provide connections between existing motorized trails.

Rationale for elimination: The SNF looked carefully at routes that connect existing motorized recreation opportunities. To the extent that the routes met the review criteria these routes have been included in at least one of the four action alternatives analyzed. This alternative proposing

these eleven specific routes was not analyzed in detail because it 1) has substantially similar consequences as alternatives considered in detail; 2) is not significantly distinguishable from alternatives already being considered; and 3) the existing range of alternatives sets forth alternatives necessary to permit a reasoned choice.

All NFTS Roads to Have Mixed Use on all NFTS Roads

This alternative proposed that the SNF designate all NFTS roads as having mixed use.

Rationale for elimination: This alternative was not analyzed in detail because it presents a major safety hazard and therefore is considered infeasible.

No Closure of Maintenance Level (ML) 1 Roads

This alternative proposed that the SNF leave all ML 1 roads open.

Rationale for elimination: As described in the purpose and need, this alternative is in direct conflict with Forest Service policy (FSH 7700.59 62.32) and the purpose and need of the action is to remedy this conflict. Therefore, this alternative was not analyzed in detail because it does not meet the purpose and need and it is inconsistent with basic policy objectives for the action.

Expand OHV Recreation Opportunities Consistent with Anticipated Growth of OHV Recreation

This alternative proposed that the SNF expand the number of routes commensurate with the projection of future OHV use.

Rationale for elimination: This alternative was not analyzed in detail because it is speculative as to what the needs of future OHV recreation will be and the opportunity exists to continue to add routes to the NFTS as appropriate over time.

Alternative 2 plus Additional Wildlife Protections for Lahontan Cutthroat Trout

This alternative proposed that the SNF take measures to protect wildlife with particular emphasis on the Lahontan cutthroat trout.

Rationale for elimination: This alternative was not analyzed in detail because Alternative 4 is highly protective of wildlife. This alternative has substantially similar consequences as Alternative 4 which was considered in detail; it is not significantly distinguishable from alternatives already being considered; and the existing range of alternatives sets forth alternatives necessary to permit a reasoned choice.

Alternative 4 and 5 While Omitting Year-round Road Closures

This alternative proposed that the SNF analyze an alternative incorporating all aspects of Alternative 4 without including the year-round road closures.

Rationale for elimination:

The suggested alternative was eliminated from detailed study because it would not meet the purpose and need (i.e. item 3.c.) and would not respond to the criteria set out in Subpart B of the Travel Management Rule to consider impacts to natural and cultural resources, etc. as described in Chapter 1 of this FEIS. Also, this alternative would be in direct conflict with Forest Service policy to close (apply year-round closures) to ML roads to public use (FSH 7700.59 62.32).

Alternative Proposed by the Stewards of the Sierra

This alternative proposed that the SNF develop an alternative that is essentially like Alternative 5 but includes some routes omitted from Alternative 5 and included in Alternative 2.

Rationale for elimination: This alternative was not analyzed in detail because of its similarities to Alternative 5 and Alternative 2. Therefore this alternative has substantially similar consequences as alternatives considered in detail; is not significantly distinguishable from alternatives already being considered; and the existing range of alternatives sets forth alternatives necessary to permit a reasoned choice.

2.5 Part 4 – Comparison of Alternatives _____

Chapter 3 describes the environmental consequences of the alternatives in detail. This section of Chapter 2 compares the alternatives by summarizing key differences between the alternatives.

2.5.1 Summary Comparison of Alternatives by Action

Table 2- 11. Summary Comparison of Alternatives

Notes: Except when x<1: miles and acres rounded to the nearest whole number; AV= all vehicles; HV= highway-legal vehicles only; MC= motorcycles only; ML= maintenance level; AV HLO= highway-legal vehicles and all vehicles with highway licensed operators

Current Management (Alt 1-affected environment)	Action Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Continues 605,000 acres open to motorized cross-country travel (includes parking one vehicle length off the NFTS unless posted otherwise.)	1. Cross-country travel	No change from current management; cross-country travel is allowed	Prohibit motorized cross-country travel (allows parking one vehicle length off the NFTS unless posted otherwise)	Prohibit motorized cross-country travel (allows parking one vehicle length off the NFTS unless posted otherwise)	Prohibit motorized cross-country travel (allows parking one vehicle length off the NFTS unless posted otherwise)	Prohibit motorized cross-country travel (allows parking one vehicle length off the NFTS unless posted otherwise)
	2. Additions to the NFTS (appropriate season of use applied to all proposed additions)					
	a. Trails added					
56 mi NFTS trails open to AV	Trails open to AV	No additions	16 mi added 72 mi total	No additions	20 mi added 76 mi total	32 mi added 88 mi total
0.9 mi NFTS trails open to vehicles < 50"	Trails open to vehicles < 50"	No additions	20 mi added 21 mi total	No additions	19 mi added 20 mi total	32 mi added 33 mi total
0 mi NFTS trails open to MC	Trails open to MC	No additions	3 mi added 3 mi total	No additions	3 mi added 3 mi total	6 mi added 6 mi total trails
	b. Roads added					
524 mi NFTS roads open HV	Roads open to HV	No additions	0 mi added 524 mi total	No additions	0 mi added 524 mi total	0 mi added 524 mi total
1650 mi NFTS roads open AV	Roads open to AV	No additions	5 mi added 1655 mi total	No additions	9 mi added 1659 mi total	15 mi added 1665 mi total roads

Current Management (Alt 1-affected environment)	Action Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	c. Areas added					
5 Open Areas (75 acres)	Open Areas (open to AV)	No additions	1 area (6 acres) added 6 areas (81 acres) total	No additions	5 area (34 acres) added 10 areas (109 acres) total	10 area (98 acres) added 15 areas (173 acres) total
54 Parking/staging areas (49 acres)	Parking/staging areas (open to HV)	No additions	0 areas (0 acres) added 54 areas (49 acres) total	No additions	6 areas (3 acres) added 60 areas (52 acres) total	10 areas (7 acres) added 64 areas (49 acres) total
3. Changes to the NFTS (appropriate season of use applied to all NFTS roads and trails)						
	a. Changes to Vehicle Class	none	Total changes = 97 mi	none	Total changes = 104 mi	Total changes = 260 mi
528 mi roads seasonally open to HV	Change road from open AV to open HV Change road from closed HV to open HV	No change from current management	12 mi open AV to open HV 11 mi closed HV to open HV 510 mi HV remain open 532 mi NFTS roads open to HV	No change from current management	7 mi open AV to open HV 4 mi closed HV to open HV 475 mi HV remain open 486 mi NFTS roads open to HV	7 mi open AV to open HV 4 mi closed HV to open HV 375 mi HV remain open 386 mi NFTS roads open to HV
56 mi motorized trails seasonally open to AV	Change road from closed (ML 1) or open AV to motorized trail open to AV	No change from current management	3 mi road to trail open AV 59 total mi trails open to AV	No change from current management	2 m road to trail open AV 58 total mi trails open to AV	5 mi road to trail open AV 61 total mi trails open to AV
0.9 mi motorized trails seasonally open to vehicles < 50"	Change road from open AV to motorized trail open to vehicles < 50"	No change from current management	4 mi road open AV to trail open vehicles <50" 5 total mi trail open to vehicles < 50"	No change from current management	7 mi road open AV to trail open vehicles <50" 8 total mi trail open to vehicles < 50"	7mi road open AV to trail open vehicles <50" 8 total mi trail open to vehicles < 50"

Current Management (Alt 1-affected environment)	Action Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
1650 mi roads seasonally open to AV	Change road from open HV only to road open to AV (mixed use) Change road from closed to open to AV	No change from current management	12 mi open HV to open AV 59 mi closed AV to open AV 1331 AV remain open 1461 total mi NFTS roads open to AV	No change from current management	25 mi open HV to open AV 60 mi closed AV to open AV 1272 AV remain open 1417 total mi NFTS roads open to AV	154 mi open HV to open AV 60 mi closed AV to open AV 1402 AV remain open 1616 total mi NFTS roads open to AV
0 mi roads open to HV and AV with HLO	Change road from open to HV only to road open to AV HLO	No change from current management	0 mi NFTS roads open to AV HLO	No change from current management	0 mi NFTS roads open to AV HLO	22 mi NFTS roads open to AV HLO
b. Changes to Season of Use						
447 mi roads seasonally open 1763 mi roads open year-round 236 mi closed year-round Total = 2447 mi NFTS roads (note: only 472 mi of roads have formal season of use closure, however many are in effect seasonally closed due to snow or lower elevation locked gates)	Roads with change in season of use	No change from current management	898 mi changed 946 mi seasonally open 1054 mi open year-round 446 mi closed year-round 2447 total NFTS roads	No change from current management	1742 mi changed 1512 mi seasonally open 383 mi open year-round 552 mi closed year-round 2447 total NFTS roads	1688 mi changed 1569 mi seasonally open 460 mi open year-round 418 mi closed year-round 2447 total NFTS roads

Current Management (Alt 1-affected environment)	Action Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
22 mi motorized trails seasonally open 34 miles open year-round 0 miles closed year-round	Motorized trails with change in season of use	No change from current management	21 mi changed 39 mi seasonally open 17 mi open year-round 0 mi closed year-round 56 total mi motorized trails	No change from current management	43 mi changed 55 mi seasonally open 1 mi open year-round 0 mi closed year-round 56 total mi motorized trails	43 mi changed 55 mi seasonally open 1 mi open year-round 0 mi closed year-round 56 total mi motorized trails
	c. Changes to Closed year-round (O = open; CI=closed)		O to CI= 290 mi, CI to O= 70 mi		O to CI= 398 mi, CI to O= 65 mi	O to CI= 278 mi, CI to O= 65 mi
84 mi of ML 1 roads closed year-round 286 mi ML 1 open	Open ML 1 roads changed to closed ML 1 roads	No change from current management	71 mi ML 1 remain closed 197 mi ML 1 open to closed 0 mi remain open	No change from current management	73 mi ML 1 remain closed 241 mi ML 1 open to closed 0 mi remain open	60 mi ML 1 remain closed 123 mi ML 1 open to closed 0 mi remain open
137 mi of ML 2 roads closed year-round 1359 mi ML 2 open	Close and Open ML 2 roads changed to closed ML 2 roads	No change from current management	78 mi ML 2 remain closed 88 mi ML 2 open to closed 59 mi ML 2 closed to open 1258 mi ML 2 remain open	No change from current management	76 mi ML 2 remain closed 129 mi ML 2 open to closed 61 mi ML 2 closed to open 1221 mi remain open	76 mi ML 2 remain closed 127 mi ML 2 open to closed 61 mi ML 2 closed to open 1220 mi remain open
14 mi ML 3-5 roads closed year-round 527 mi ML 3-5 open	Close and Open ML 3-5 roads changed to closed ML 3-5 roads for administrative and resource protection needs per LRMP	No change from current management	2 mi ML 3-5 remain closed 5 mi ML 3-5 open to closed 11 mi ML 3-5 closed to open 509 mi ML 3-5 remain open	No change from current management	10 mi ML 3-5 remain closed 28 mi ML 3-5 open to closed 4 mi ML 3-5 closed to open 475 mi ML 3-5 remain open	10 mi ML 3-5 remain closed 28 mi ML 3-5 open to closed 4 mi ML 3-5 closed to open 476 mi ML 3-5 remain open

Current Management (Alt 1-affected environment)	Action Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	<p>d. Other Changes* to NFTS Roads *where changes =changes to ML (which in most cases changes allowed vehicle class). Note: changes to vehicle class are described fully under item 3.a. above.</p>		<p>All other changes = 250 mi</p>		<p>All other changes = 172 mi</p>	<p>All other changes = 436 mi</p>
<p>286 mi ML 1 roads open 84 mi ML 1 roads closed</p>	<p>Changes* to ML 1 roads</p>	<p>No change from current management</p>	<p>13 mi ML 1 closed to ML 2 open 84 mi ML 1 open to ML 2 open 1.5 mi ML 1 to ML 3-5 open 1 mi ML 1 to motorized trail open to AV 4 mi ML 1 to motorized trail <50"</p>	<p>No change from current management</p>	<p>11 mi ML 1 closed to ML 2 open 39 mi ML 1 open to ML 2 open 0 mi ML 1 to ML 3-5 open 1 mi ML 1 to motorized trail open to AV 7 mi ML 1 to motorized trail <50"</p>	<p>25 mi ML 1 closed to ML 2 open 156 mi ML 1 open to ML 2 open 0 mi ML 1 to ML 3-5 open 0.5 mi ML 1 to motorized trail open to AV 7.5 mi ML 1 to motorized trail <50"</p>

Current Management (Alt 1-affected environment)	Action Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
1359 mi ML 2 roads open 137 mi ML 2 roads closed	Changes* to ML 2 roads	No change from current management	84 mi ML 1 open to ML 2 open 13 mi ML 1 closed to ML 2 open 11 mi ML 2 open to ML 3-5 road 1.5 mi ML 2 open to motorized trail open to AV 12 mi ML 3-5 open to ML 2 open 1 mi ML 3-5 closed to ML 2 open	No change from current management	39 mi ML 1 open to ML 2 open 11 mi ML 1 closed to ML 2 open 7 mi ML 2 open to ML 3-5 road 1 mi ML 2 open to motorized trail open to AV 25 mi ML 3-5 open to ML 2 open	156 mi ML 1 open to ML 2 open 25 mi ML 1 closed to ML 2 open 7 mi ML 2 open to ML 3-5 road 4 mi ML 2 open to motorized trail open to AV 24 mi ML 3-5 open to ML 2 open
527 mi ML 3-5 roads open 14 mi ML 3-5 roads closed	Changes* to ML 3-5 roads	No change from current management	1 mi ML 1 open to ML 3-5 open 11 mi ML 2 open to ML 3-5 open 12 mi ML 3-5 open to ML 2 open 1 mi ML 3-5 closed to ML 2 open	No change from current management	0 mi ML 1 open to ML 3-5 open 7 mi ML 2 open to ML 3-5 open 25 mi ML 3-5 open to ML 2 open 0 mi ML 3-5 closed to ML 2 open	0 mi ML 1 open to ML 3-5 open 7 mi ML 2 open to ML 3-5 open 24 mi ML 3-5 open to ML 2 open 0 mi ML 3-5 closed to ML 2 open

Current Management (Alt 1-affected environment)	Action Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
4. Non-significant LRMP Amendments						
110,500 acres Semi-Primitive Non-Motorized ROS class	a. Recreation- ROS Element Map (LRMP S&G # 22) Adjust acres of Semi-Primitive Non-Motorized ROS to Semi-Primitive Motorized Elements on the ROS Element Map	No change from current management	Remove 512 acres from Semi-Primitive Non-motorized ROS Class. Add 512 acres to Semi-Primitive Motorized ROS Class.	No change from current management	Remove 1,074 acres from Semi-Primitive Non-motorized ROS Class. Add 1,074 acres to Semi-Primitive Motorized ROS Class.	Remove 1,074 acres from Semi-Primitive Non-motorized ROS Class. Add 1,074 acres to Semi-Primitive Motorized ROS Class.
S&G #17 includes these sentences: "Open all ML 1 and 2 Roads for OHV use unless designated as closed. <i>Maintenance Level 3, 4 and 5 roads are closed to unlicensed OHV use unless designated as a combined use road.</i> "	b. Recreation- OHV (LRMP S&G # 17) Amend the LRMP	No change from current management	Amend the LRMP S&G #17 to state "... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions."	No amendment to the LRMP	Amend the LRMP S&G #17 to state "... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions "	Amend the LRMP S&G #17 to state "... allow no cross-country OHV travel. Designate NFTS roads, motorized trails, and areas on the Forest which may be legally traveled with an OHV, as well as the allowed vehicle class, and any seasonal or other use restrictions."

2.5.2 Summary Comparison of Alternatives by Environmental Effects

Table 2- 12 displays a comparison of all five alternatives, by environmental effects.

Table 2- 12. Summary Direct and Indirect Effects of the Alternatives on Forest Resources

Resource Area	Indicator	Alt 1 ¹	Alt 2	Alt 3	Alt 4	Alt 5
Transportation Facilities (page 3-15)	Annual maintenance cost for NFTS roads and trails	\$1,887,000	\$1,888,000	\$1,721,000	\$1,820,000	\$1,949,000
	Implementation costs (mitigation, signing, MVUM, etc)	\$95,000	\$477,000	\$110,000	\$481,000	\$857,000
Recreation Resources (page 3-31)	Miles of roads available for non-highway licensed vehicles	1741	1431	1741	1332	1513
	Miles of primitive roads managed as trails	41	41	41	41	41
	Miles of motorized trails available	57	103	57	108	139
	Acres of areas designated for motor vehicle use (Open Areas, parking/staging areas)	124	130	124	161	222
	Acres of land open to motorized cross-country travel	605,000	0	0	0	0
	Miles of unauthorized routes not receiving motorized use within ROS Class Semi-Primitive, Non-Motorized	0 miles	9.5 miles	10.3 miles	8.7 miles	8.7 miles

Resource Area	Indicator	Alt 1 ¹	Alt 2	Alt 3	Alt 4	Alt 5
Visual Resources (page 3-93)	Number of key viewsheds that are or have the potential to be affected by motor vehicle travel	6 key viewsheds; however, all 22 key viewsheds may potentially have negative effects on visual resources due to the continued proliferation of cross-country motor vehicle travel	0 key viewsheds; no negative effects on visual resources from all key viewsheds	0 key viewsheds; no negative effects on visual resources from all key viewsheds	0 key viewsheds; no negative effects on visual resources from all key viewsheds	0 key viewsheds; no negative effects on visual resources from all key viewsheds
Air Quality (page 3-134)	Impacts to air quality due to pollutants of concern or public health due to naturally-occurring asbestos (NOA)	none	none	none	none	none
	Number of Routes in potential NOA terrain	157	8	0	8	8
	Miles	47	2.9	0	3.44	3.44
Cultural Resources (page 3-114)	Number of cultural resources at risk from ongoing use and of the total, the number with moderate or major severity of effect	236 total severity of effect not determined	6 total 4 sites with Standard Protection Measures applied to reduce moderate effects to negligible effects	0 total	12 total No moderate or major effects	26 total 10 sites with Standard Protection Measures applied to reduce moderate or major effects to negligible effects

Resource Area	Indicator	Alt 1 ¹	Alt 2	Alt 3	Alt 4	Alt 5
Soil Resource (page 3-144)	Miles of unauthorized routes available for motorized use ² with high potential for adverse effects	8.5	4.58	0	0.5	1.6
	Miles of NFTS native surface roads (on sensitive soils) open year-round	574	421	574	338	343
Water Resources (page 3-175)	Miles of unauthorized routes and acres of areas available for motorized use ² in RCAs	156 mi 208492 acres	10 mi 3 acres	0 mi 0 acres	11mi 3 acres	22 mi 7 acres
	Number of stream crossings on unauthorized routes available for motorized use	2251	235	0	188	361
	Subwatersheds with Potential cumulative watershed effects (CWE Risk): Low Moderate High	15 5 5	9 2 2	21 3 1	16 2 0	17 3 2
Geologic Resources (page 3-166)	Number of unauthorized routes (Alt 1) or added facilities that are within 0.5 miles of abandoned mine lands (AML)	612	34	0	4	20

Resource Area	Indicator	Alt 1 ¹	Alt 2	Alt 3	Alt 4	Alt 5
Botanical Resources (page 3-251)	Determinations for TES ³ species					
	No effect (TES)	10 S species	1 T species 1 E species 39 S species	1 T species 1 E species 41 S species	1 T species 1 E species 39 S species	1 T species 1 E species 37 S species
	May affect but is not likely to adversely affect (TE)	1 T species 1 E species	No species	No species	No species	No species
	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability (S) (*highest probability for negative effect)	35 S species	6 S species * <i>Peltigera hydrothyria</i>	4 S species	6 S species * <i>Yosemite lewisia</i>	8 S species * <i>Yosemite lewisia</i>
Noxious Weeds (page 3-300)	Number of noxious weed infestations within 200 ft of a proposed facility	Possible spread to all 605,000 acres and beyond	7	0	13	30
Terrestrial Wildlife (page 3-323)	Determinations for TES ³ species					
	No effect (TES)	No species	VELB, Bald eagle (BAEA), Willow flycatcher (WIFL)	VELB, BAEA, WIFL	VELB, BAEA, WIFL	VELB, BAEA
	May affect but is not likely to adversely affect (TE)	Valley Elderberry Longhorn beetle (VELB)	No species	No species	No species	No species

Resource Area	Indicator	Alt 1 ¹	Alt 2	Alt 3	Alt 4	Alt 5
Terrestrial Wildlife (continued)	May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability (S)	California spotted owl (CASPO), Northern Goshawk (NOGO), Great gray owl (GGO), American Marten (AMMA), Pacific Fisher (PAFI), Bald Eagle (BAEA), Willow flycatcher (WIFL), Western red bat (WERB), Pallid bat (PABA), Townsend's big eared bat (TOBE)	CASPO, NOGO, GGO, AMMA, PAFI, WERB, PABA, TOBE	CASPO, NOGO, GGO, AMMA, PAFI, WERB, PABA, TOBE	CASPO, NOGO, GGO, AMMA, PAFI, WERB, PABA, TOBE	CASPO, NOGO, GGO, AMMA, PAFI, WERB, PABA, WIFL, TOBE
Aquatic Biota (page 3-472)	Determinations for TES ³ species					
	No effect (TES)	No species	Lahontan cutthroat trout (LCT), California red-legged frog (CRLF)	LCT; CRLF; Foothill yellow-legged frog (FYLF); Relictual slender salamander (RSS); Mountain yellow-legged frog (MYLF); Western pond turtle (WPT); Yosemite toad (YT)	LCT	LCT
	May affect but is not likely to adversely affect (TE)	LCUT, CRLF	No species	No species	CRLF	CRLF

Resource Area	Indicator	Alt 1 ¹	Alt 2	Alt 3	Alt 4	Alt 5
	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability (S) (*highest probability for negative effect)	FYLF*; RSS*; MYLF*; WPT*; YT*	FYLF; RSS; MYLF; WPT; YT	No species	FYLF; RSS; MYLF; WPT; YT	FYLF; RSS; MYLF; WPT; YT

¹ Although public use of all existing unauthorized routes would be allowed in Alternative 1, none of the unauthorized routes would be added to the NFTS. Because these unauthorized routes would not be part of the NFTS, they would not have any status or authorization as NFTS facilities, nor would existing resource concerns be mitigated.

² Unless otherwise indicated, ‘miles of unauthorized routes available for motorized use’ refers to those unauthorized routes added to the NFTS in the action alternatives, not existing NFTS roads. For the no action alternative, this measure includes all unauthorized routes.

³T = Threatened, E = Endangered, S = Forest Service Sensitive

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CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter summarizes the physical, biological, social and economic environment that would be affected by the proposed action and alternatives and the effects on the environment that would result from implementation of each of the alternatives. This chapter also presents the scientific and analytical basis for comparison of the alternatives presented in Chapter 2.

The affected environment section under each resource topic describes the existing or baseline, condition against which environmental effects were evaluated and from which progress toward the desired condition can be measured. Environmental consequences form the scientific and analytical basis for comparison of alternatives, including the proposed action, through compliance with standards set forth in the LRMP. The environmental consequences discussion centers on direct, indirect and cumulative effects, along with applicable mitigation measures. Effects can be neutral, beneficial or adverse. Documentation of irreversible and irretrievable commitments of resources is located in section 3.1.4. These terms are defined as follows:

- **Direct effects** are caused by the action and occur at the same place and time as the action.
- **Indirect effects** are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable.
- **Cumulative effects** are those that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions.

3.1.1 Analysis Process

The environmental consequences presented in Chapter 3 address the effects of the actions proposed under each alternative for the SNF. This effects analysis was done at the forest scale (the scale of the proposed action as discussed in Ch.1). However, the effects findings in this chapter are based on expected changes due to the prohibition of motorized cross-country travel, the site specific analyses of each road, trail and area proposed for addition to the NFTS, any changes in vehicle class and/or season of use for NFTS roads, trails and areas, and proposed non-significant LRMP amendments.

The effects analysis methodology focuses on the assumptions and indicator measures for addressing the direct, indirect and cumulative effects of implementation of each of the alternatives. To present the conclusions of the analysis in the environmental consequences section, the direct and indirect effects of implementing each alternative as a whole are displayed. The cumulative effects of this action are in combination with the effects of past, present and reasonably foreseeable future actions.

The Forest Service uses the best science and the most current and complete data available. Geographic Information System (GIS) data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those intended may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification.

Each affected road, trail and area (in the context of an NFTS facility, the term “area” refers to an Open Area, parking, or staging area, except where these are described individually) proposed in the alternatives has been reviewed by Forest recreation and road managers and environmental resource specialists. Their findings are documented in Appendix A (summary) and the project record. Readers seeking more detailed information concerning the environmental effects associated with a specific road, trail or area are directed to Appendix A and the project record, where details of site-specific data are documented.

For ease of documentation and understanding, the effects of the alternatives are described separately for four discrete actions and then summarized under cumulative effects. The combination of these discrete actions is then added to the past, present and reasonably foreseeable actions in the cumulative effects analysis. The four discrete actions common to all action alternatives are:

- 1. Prohibition of cross-country motor vehicle travel.** The direct and indirect effects of this action are described generally in each alternative, considering both current conditions and projected trends. Both short- (1 year) and long-term (approximately 20 years) effects are presented.
- 2. Addition of new facilities (roads, trails and/or areas) to the NFTS.** The effects of adding facilities are addressed in sum total by resource type in this chapter. For most resources, one or more resource indicators are used to measure the direct and indirect effects of each alternative. Both short (1 year) and long-term (approximately 20 years with the exception of Cumulative Watershed Effects [CWE] which are approximately 30 years) effects are presented.
- 3. Changes to vehicle class, season of use and road closures on the NFTS.** Effects caused by changes to vehicle class, season of use, and road closures on the NFTS are described generally by alternative. For most resources, one or more resource indicators are used to measure the direct and indirect effects of each alternative. Both short (1 year) and long-term (approximately 20 years) effects are presented.

4. Non-Significant LRMP Amendments:

S&G #22: The effects of this action are addressed specifically in the recreation section. For every other resource, the effects are the same as the effects of adding routes to the NFTS, which are addressed under action #2 “addition of new facilities.”

S&G #17: For all resources the effects of this action are the same as the effects of changes to the NFTS, which are addressed under action #3 “Changes to the NFTS.”

Cumulative Effects

According to the Council on Environmental Quality (CEQ) NEPA regulations, a “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7).

The cumulative effects analysis area is described under each resource, but in most cases encompasses the entire SNF (except designated wilderness) including private and other public lands that lie within the SNF boundary. Past activities are considered part of the existing condition and are discussed in the affected environment (existing conditions) and environmental consequences section under each resource.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, as described in the “Environmental Consequences” section, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing

conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

With the exception of the Baseline CWE Analysis (see Section 3.10.4), this cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond) and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the CEQ issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.” For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Appendix E lists present and reasonably foreseeable future actions potentially contributing to cumulative effects.

3.1.2 Short-Term Uses and Long-Term Productivity

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity (40 CFR 1502.16).” As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101). All action alternatives (Alternatives 2-5) could potentially improve the long-term productivity by reducing the acreage of area open to cross-country motorized travel on the landscape. Acreage not designated for public motorized use will eventually revert to vegetated conditions, reducing many of the adverse effects related to cross-country motor vehicle use. Of the alternatives, Alternative 1 is likely to have the least improvement to long-term productivity.

3.1.3 Unavoidable Adverse Effects

Implementation of any of the action alternatives (Alternative 2-5) would not result in unavoidable adverse environmental effects. Implementation of Alternative 1 is most likely to result in unavoidable adverse effects. The environmental consequences section for each resource area discusses these effects.

3.1.4 Irreversible and Irretrievable Commitments

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a

period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road. The closure to cross-country travel, addition of unauthorized routes, changes to the NFTS, and adoption of two non-significant LRMP amendments are not anticipated to cause an irreversible or irretrievable commitment of resources.

3.1.5 Affected Environment Overview

All resources share many aspects of the affected environment. In order to avoid repeating these shared elements of the affected environment in each resource section the following general elements of the affected environment are provided.

Unmanaged motor vehicle use has resulted in unplanned roads and trails, erosion, watershed and habitat degradation, and impacts to cultural resource sites. On some SNF lands, long managed as open to cross-country motor vehicle travel, repeated use has resulted in unplanned, unauthorized, routes and areas. These generally developed without environmental analysis or public involvement and do not have the same status as the NFTS.

Project Area

The project area includes approximately 800,000 acres of SNF System lands (see Map of Project Area including Analysis Units, Figure 1-2) with the exception of designated wilderness and special areas identified in the LRMP (e.g. the Kings River Special Management Area, research natural areas) (USDA-FS 1991: 4.3.19).

Analysis Units

Analysis units divide the project area by geographic and transportation boundaries to be more easily understood by the public on a map. They are organized from north to south. In some cases, information has been organized by analysis unit to aid the reader in navigating the document and locate features on the map.

There are approximately 800,000 acres encompassed within these analysis units. The following is a summary of analysis units and approximate acreage of each:

South Fork Analysis Unit (SFM) 70,550 acres

Located on the Bass Lake Ranger District, this unit is bordered by the Merced Wild and Scenic River to the north and bisected by the South Fork of the Merced Wild and Scenic River. Vegetation includes (chamise and manzanita) chaparral, live oak woodland, blue oak/gray pine woodland, ponderosa pine forest and mixed-conifer forest. The Chowchilla area includes the Devil's Peak Botanical Area, Ferguson Ridge and Devil's Gulch Roadless Areas. Most of the area is not easily accessible by foot or vehicle.

Westfall Analysis Unit (WES) 84,570 acres

This unit is a section of the Bass Lake Ranger District that is bordered by Yosemite National Park to the north, Miami Mountain to the west and Bass Lake to the south. This area spans several vegetation types from chaparral (both chamise and ceanothus/manzanita), blue oak woodlands, ponderosa pine forest, mixed conifer forest and some small amounts of white fir/red fir forest. Adjacent to private lands and Yosemite National Park, this location makes it popular for recreation activities. Chowchilla River, Big Creek and Miami Creek run through this analysis unit.

Globe Analysis Unit (GLO) 91,210 acres

Located in the north section of the Bass Lake Ranger District, the Globe analysis unit borders Yosemite National Park to its north, the Ansel Adams Wilderness to the east, some of the Sierra Vista Scenic Byway to the south and State Highway 41 to the west. Almost the entire area is located above 4000 ft in elevation and consists mostly of white fir/red fir forest, with some mixed conifer forest, montane chaparral and lodgepole forests. There are some natural lakes; many wet meadows and notable creeks include Big Creek and portions of Chiquito Creek. Nelder Grove holds the largest concentration of giant sequoias on the SNF. The far eastern portion of the area is used as a starting point for backcountry trips, while much of the area is used for camping and hiking. There are several private inholdings dispersed throughout this area. This area contains significant granitic outcrops, especially around the Bowler campground area. Mt. Raymond Inventoried Roadless Area is within the analysis unit.

Gaggs Analysis Unit (GAG) 87,190 acres

Gaggs analysis unit comprises the center portion of the Bass Lake Ranger District areas, with Bass Lake on the west end, the Sierra Vista Scenic Byway to the south and north and roads 6S71/6S01 to the east. The unit is dominated by Shuteye and Little Shuteye Peak, with Whiskey Ridge and the South Fork Bluffs being notable as well. Elevations range from about 2000 ft to 8357 ft at Shuteye Peak. A range of vegetation types are found here, from blue oak/gray pine woodland, whiteleaf manzanita/ceanothus chaparral, ponderosa pine forest, mixed-conifer forest, white fir/red fir forests, as well as stands of lodgepole forest. Numerous meadows, both wet and dry, are found through the area; some of the larger riparian features are Willow, Rock, Whiskey and Chiquito Creeks. Granitic ridges are the dominant morphological feature of the unit.

Mammoth Analysis Unit (MAM) 54,130 acres

This unit is a relatively narrow area on the Bass Lake Ranger District that has Mammoth Pool Reservoir on its eastern edge and Sierra Vista Scenic Byway as the western boundary. Going north until the Ansel Adams Wilderness area, it is primarily composed of steep granitic outcrops that plunge into the San Joaquin River. Vegetation consists of chaparral (in lower and higher elevations), ponderosa pine forest, mixed-conifer forest and some red-fir and lodgepole forest to the north. There are several creeks that cross the area enroute to the San Joaquin River. There are some notable granitic formations, such as Balloon Dome and Fuller Buttes.

Stump Springs-Big Creek Analysis Unit (SSB) 85,400 acres

Located on the High Sierra Ranger District, this unit circles around the Kaiser Wilderness from Big Creek to the south and reaches around to the north side of the Kaiser Wilderness. Some notable features include Mt. Tom, Huntington Lake and Mushroom Rock. The San Joaquin River (including Mammoth Pool Reservoir) forms the main boundary to the west and the Middle Fork San Joaquin is the northern boundary. Much of the area is steep near the rivers but the northern portion is somewhat flat and is primarily a mixed-conifer forest with some red-fir and lodgepole forest pockets. Also, the analysis unit has large extent of montane chaparral, especially near the Big Creek area.

East of Kaiser Pass Analysis Unit (EKP) 13,120 acres

This unit is an area on the High Sierra District starting with Kaiser Pass on the south end and encompasses the non-wilderness areas between the John Muir and Kaiser Wildernesses. Primarily red-fir forest and lodgepole, there are some relatively lower portions containing mixed conifer

forest while some small areas have subalpine forest with western juniper, mountain hemlock, whitebark pine and western white pine. This analysis unit is dominated by granitic outcrops and contains Florence Lake and Lake Thomas Edison, as well as some portions of the South Fork of the San Joaquin.

Jose-Chawanakee Analysis Unit (JCH) 46,670 acres

Bordered by the San Joaquin River to the north, this unit is on the High Sierra Ranger District and is characterized by blue oak/gray pine woodland, type-converted annual grasslands, chaparral, cismontane forest, ponderosa pine forest and mixed conifer forest. Jose Basin is included in this unit. There are some riparian areas and steep granitic areas that drop into the San Joaquin River gorge.

Tamarack-Dinkey Analysis Unit (TAD) 112,650 acres

A higher elevation unit (5500-10000 ft) on the High Sierra Ranger District, the Tamarack-Dinkey analysis unit consists of mixed-conifer forest, red-fir forest, mountain whitethorn chaparral, lodgepole forest and some subalpine meadow and shrub habitat. There is one stand of giant sequoia within this unit (McKinley Grove), as well as several wet meadows and fens, lakes and riparian areas. There are some prominent granitic areas, especially near Courtright and Wishon Reservoirs. Some of the larger creeks include Dinkey Creek, Deer Creek, Tamarack Creek and portions of Big Creek. Dinkey Lakes Inventoried Roadless Area is contained within this unit.

Dinkey-Kings Analysis Unit (DNK) 154,100 acres

The Dinkey-Kings analysis unit is on the High Sierra Ranger District and extends northward from the Kings River to Dinkey Creek/McKinley Grove Road. Elevation ranges from about 1500 to 6000 ft. This area is composed of blue oak/gray pine woodlands, whiteleaf manzanita/ceanothus chaparral, ponderosa pine forest, mixed-conifer forest and some red-fir forest. It has several granitic areas composed of open domes and large rock formations, limestone outcrops, riparian areas, wet meadows and fens. The Kings River forms the southern boundary of the analysis unit and is a major watershed for the SNF; there are several tributaries for the Kings River in this analysis unit. Sycamore Springs and Rancheria Inventoried Roadless Areas are found within this analysis unit.

Resource Reports

Each section in this chapter provides a summary of the project-specific reports, assessments and input prepared by Forest Service specialists, which are incorporated by reference in this Final Environmental Impact Statement (FEIS). The following reports and memoranda are incorporated by reference: Botanical Biological Evaluation, Noxious Weed Risk Assessment; Cumulative Watershed Effects Report; Management Indicator Species Report and Biological Assessment and Biological Evaluation (BA/BE), Archeological Reconnaissance Report and others. These reports or memoranda are part of the project record on file at the SNF headquarters in Clovis, CA.

Site Specific Data (Route Cards)

Site specific data for those unauthorized routes and areas brought forward for detailed study in one or more of the action alternatives was gathered and analyzed by all resource specialists. For facilities proposed to be added to the NFTS, resource issues (displayed as resource issue codes) were identified by resource specialists. This information provided the environmental data necessary to determine prescriptive actions needed to avoid or mitigate adverse environmental

effects. The route cards (Appendix A, Tables A-1 and A-2) identify the alternative(s) under which the facility is proposed, the resource issue codes, type of vehicle allowed, the season of use, and any required prescriptive action that would be implemented prior to publication on a MVUM and allowing public use.

Law Enforcement

Appendix D details law enforcement authority and jurisdiction, cooperation, implementation and tracking, implementation strategy, assumptions and measures of success.

Enforcement Assumptions

1. Laws and regulations related to Travel Management will be enforced equally in authority and weight as all other Federal laws and regulations. As with any change in a regulation on NFS lands, there is usually a transitional period for the public to understand the changes. A higher number of violations is anticipated in the first few years and the number of violations will decline as the users understand and comply with the rules.
2. Law enforcement officers and Agency personnel presence and enforcement actions will positively affect motor vehicle users' behaviors and attitudes.
3. The MVUM will clearly define the designated facilities.
4. Once the MVUM is published, the implementation of the designated system of roads, trails and areas with signs and user education programs, will reduce the number of violations.
5. The proposal for additional NFTS facilities through some action alternatives is anticipated to assist enforcing the shift from an "open to cross-country motor vehicle travel" management situation to one where such use is prohibited. These actions provide opportunities and access where such use was occurring in key popular dispersed locations based upon recreation analysis and public input. Providing opportunities in popular, key areas will help relieve pressure to travel off of designated facilities.
6. For the purposes of this document it is assumed that current regulations are being enforced. In the designated area where cross-country motor vehicle travel is currently prohibited (See Figure 1-3), it is assumed that enforcement of this prohibition will benefit from publication of the MVUM (for example, recreationists will be better informed about areas where cross-country travel is prohibited).

3.1.6 Analysis Framework: Statute, Regulation, LRMP and Other Direction

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with other environmental review laws and executive orders." Each resource section includes a list of applicable laws, regulations, policies and Executive Orders that are relevant to that resource. Surveys, analyses and findings required by those laws are addressed in those sections.

National Forest Management Act (NFMA)

Specifically for OHV management, NFMA requires that this use be planned and implemented to protect land and other resources, promote public safety and minimize conflicts with other uses of the NFS lands. NFMA also requires that a broad spectrum of forest and rangeland-related outdoor recreation opportunities be provided that respond to current and anticipated user demands.

The Forest Service is complying with the provisions of this law.

2005 Travel Management Rule (36 CFR 212, 251, 261 and 295)

Travel Management Rule, Subpart B (36 CFR 212) is the implementing regulation for the Forest Road Transportation Atlas (FRTA) and includes portions of the Travel Management Rule published in the Federal Register on November 9, 2005. Part 212 provides criteria for designation of roads, trails and areas. Providing safe transportation facilities and considering the affordability of maintaining the transportation facilities are two of the criteria. The Travel Management Rule also requires that in designating NFTS roads, trails and areas, responsible officials consider the provision of recreational opportunities; public access needs; conflicts among uses of NFS lands, including other recreational uses; and the compatibility of motor vehicle use with existing conditions in populated areas.

Criteria that incorporated Executive Orders 11644 and 11989:

1. The responsible official shall consider the effects of designated roads, trails and areas on the provision of recreational opportunities, access needs and conflicts among uses of National Forest System lands 36 CFR 212.55 (a).
2. The responsible official shall consider effects on the following, with the objective of minimizing: Conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring Federal lands; Conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring Federal lands; and the compatibility of motor vehicle uses with existing conditions in populated areas, taking into account sound, emissions and other factors 36 CFR 212.55 (b).

The Forest Service is complying with the provisions of this law.

Forest Service Manual Sections 2350 and 7700

Forest Service Manual Sections 2350 and 7700 contain Agency policy for management of the NFTS. The policy requires the development of trail management objectives (TMO) and road management objectives (RMO). The TMOs and RMOs document the purpose of each trail or road. The purpose for the trail or road sets the parameters for maintenance standards needed to meet user needs, resource protection and public safety. Forest Service Handbook 7709.58 describes the maintenance management system the Forest Service uses and the maintenance standards needed to meet road management objectives (RMOs) for the road system and include considerations for public safety. Forest Service Handbook 2309.18 describes the technical guidelines for the survey, design, construction, maintenance and assessment to meet TMOs for the trail system and include considerations for public safety.

LRMP Direction

The LRMP provides goals for the transportation and facility resource and requires a broad range of developed and dispersed recreation opportunities in balance with existing and future demand (USDA-FS 1991).

There are three levels of direction in the LRMP. The first level of direction is the Forest Goals and Objectives (Section 4.2). Goals and objectives provide broad, overall direction for type and amount of goods and services the Forest will provide in the future. The second level is a discussion of Future Conditions of the Forest (Section 4.3). The third level is general

Management Prescriptions (Section 4.4) and Management Standards and Guidelines (Section 4.5).

The LRMP provides goals for the recreation resource and requires a broad range of developed and dispersed recreation opportunities in balance with existing and future demand. For management and conceptual convenience possible mixes or combinations of activities, settings and probable experience opportunities have been arranged along a spectrum or continuum. This continuum is called the Recreation Opportunity Spectrum (ROS) and planning for recreation opportunities using the ROS is conducted as part of LRMP. The ROS provides a framework for defining the types of outdoor recreation the public might desire and identifies that portion of the spectrum a given National Forest might be able to provide. ROS is divided into six classes: Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Rural and Urban. Each class is defined in terms of its combination of activity, setting and experience opportunities (ROS Users Guide, USDA-FS 1986). The intent is to use ROS and its associated settings to provide recreation input into LRMP which in turn may be incorporated into LRMP management prescriptions or used in project level planning beyond the programmatic planning used to develop the LRMP.

These efforts provide for these recreation opportunities to meet NFMA requirements for a broad spectrum of forest and rangeland-related outdoor recreation opportunities that respond to current and anticipated user demands. As noted above, NFMA requires that off-highway vehicle opportunities be planned and implemented to protect land and other resources, promote public safety and minimize conflicts with other uses of the NFS lands. For the purposes of travel management actions, the terminology ‘off-highway vehicle’ is applied to public wheeled motor vehicle use (highway-legal and non-highway legal). How ROS applies to the LRMP depends on how (or if) it was integrated into the management prescriptions and associated standards and guides in the LRMP.

LRMP Standards and Guidelines

Management standards and guidelines more specifically describe how SNF goals and objectives will be achieved. They also set minimum conditions that must be maintained while achieving the goals and objectives and adhering to policy. The management and resource guidance in the LRMP that relates to roads, trails and motorized areas is listed below.

LRMP Goals and Objectives #1	Provide a broad spectrum of dispersed and developed recreation opportunities in accord with identified needs and demands and meet Recreation Opportunity Spectrum (ROS) Class objective shown on the ROS element maps.
LRMP Goals and Objectives #3	Manage most visually sensitive areas in the SNF by placing major roads, trails, streams and areas of concentrated visitor use in scenic corridors and managed viewsheds.
Future Conditions 4.3.4 Recreation	... Some additional OHV routes and areas will be designated where cross-country travel was previously allowed. Forest Plan implementation will also include development of a new Forest ORV Plan which will designate an OHV route system and contain management direction from the Forest Plan. ... This new plan replaces the 1977 ORV Plan.
4.4 Management Prescriptions	Management prescriptions are sets of overall direction for managing individual land units.

4.4.4 Limited-Timber Yield (Class III)	OHV use...are permitted when emphasized resource values such as visual, soils and wildlife can be protected.
4.4.5 Modified-Timber Yield (Class II)	Recreation opportunities are primarily for dispersed activities in a roaded natural setting. OHV use is permitted on designated routes or areas.
4.4.6 Full-Timber Yield (Class I)	Dispersed recreational opportunities exist in a roaded natural setting. OHV use is permitted on designated routes or areas.
4.4.7 Developed Recreation (pg 4-10)	Rural and roaded natural recreational opportunities are stressed. OHV use is prohibited, except for ingress and egress.
4.4.8 Administrative Sites	OHVs are restricted to roads.
4.4.10 Special Management Area (Kings River)	OHV use is restricted to designated roads and trails.
4.4.11 Experimental Forest	OHV use is prohibited.
4.4.15 Dispersed Recreation	This prescription emphasizes dispersed recreational opportunities, primarily in semi-primitive, roaded natural and rural recreational opportunity-class settings. ...Road construction is held to a minimum with most roads closed to retain dispersed recreational opportunities in a semi-primitive non-motorized or motorized setting. OHV use of access routes in most of these areas is generally allowed to continue. Semi-primitive non-motorized areas are closed to OHV use.
4.5 Standards and Guidelines (S&G)	These management standards and guidelines supplement National and regional standards, guidelines and direction and also complete the management prescriptions for the management areas.
4.5.2.1 Recreation Standards and Guidelines (S&G) #14	Provide increase in road and trail construction to facilitate opportunities for dispersed use.
4.5.2.1 Recreation (S&G) #15	Provide opportunities for increasing dispersed recreation about 15 percent by 2000.
4.5.2.1 Recreation (S&G) #16	Rehabilitate facilities in dispersed recreational areas for visitor comfort and site protection by 2005.
4.5.2.1 Recreation (S&G) #17	Allow no cross-country OHV travel. Designate additional OHV routes in areas where cross-country travel was previously allowed. Open all Maintenance Level 1 and 2 roads for OHV use unless designated as a closed. Maintenance Level 3, 4, and 5 roads are closed to unlicensed OHV use unless designated as a combined use road. Designate those trails where motor bike use will be allowed.
4.5.2.1 Recreation (S&G) #18	Provide protection and retainment of trails and OHV routes when land-disturbing activities are planned.
4.5.2.1 Recreation (S&G) #20	Limit recreational events involving motor vehicles to established or approved routes. Approved other types of events on a case-by-case basis, all to be authorized by special use permit.

4.5.2.1 Recreation (S&G) #22	Maintain acreages in each ROS class to meet objective shown on ROS Element map.
4.5.2.1 Recreation (S&G) #24	Cooperate with State, other agencies and user groups to identify and where compatible with Forest Plan management objectives, develop segments of trail that support the concept of a statewide trail system connecting use areas and providing opportunity for long distance trail touring.
4.5.2.4 Wild and Scenic Rivers (S&G) #31	Managed designated river corridors according to classification and direction established in the Wild and Scenic River Management Plan.
4.5.2.5 Fish, Wildlife and Sensitive Plants (S&G) #39	Establish a 200-foot zone on each side of all reaches of the tributaries to Portuguese Creek and Cow Creek where Lahontan cutthroat trout currently occur on all Class I, II and III tributaries above those reaches. Apply the following standards within this zone: ... c. No motor vehicles will be allowed off permanent roads except as authorized by permit or contract ...
4.5.2.5 Fish, Wildlife and Sensitive Plants (S&G) #62	For connectivity, manage a minimum of 600 foot wide travelways, identified and mapped as part of the planning record, to provide linkage between marten and fisher habitat management areas. Continue existing Forest uses in and adjacent to travel ways. Allow new management activities in travelways when they will not directly or indirectly preclude use by marten and fisher as determined by a biological evaluation.
4.5.2.5 Fish, Wildlife and Sensitive Plants (S&G) #77	Protect streamside zones by locating new roads outside of riparian areas, except at stream crossings.
4.5.2.5 Fish, Wildlife and Sensitive Plants (S&G) #78	Avoid constructing new roads within the perimeter of meadows and other riparian areas where opportunities exist to relocate or obliterate existing roads.
4.5.2.7 Range (S&G) #91	Maintain stock driveways and travelways in usable conditions.
4.5.2.8 Soil and Water (S&G) #129	Road construction on areas with High and Very High Erosion Hazard will follow standards in FSH 2509.22, Sierra Supplement Number 1 which gives direction concerning soil stabilization and road surface drainage...
4.5.2.16 Transportation and Facilities (S&G) #206	Improve arterial and collector road system to emphasize economic efficiency, user safety and protection of adjacent resources.
4.5.2.16 Transportation and Facilities (S&G) #209	All system roads are assigned to one of five maintenance levels and will be maintained and operated in accord with established road management objectives, signed by the District Ranger, on file at the District and Supervisor's office.

4.5.2.16 Transportation and Facilities (S&G) #210	<p>Controlled use of the road system including road closures, may be triggered by:</p> <ul style="list-style-type: none"> a. Wildlife protection b. Snow or adverse weather c. Hazardous fire conditions d. Need for a full range of recreational facilities e. Protection of private interests f. Mining claim access g. Protection of sensitive resources
4.5.2.16 Transportation and Facilities (S&G) #213	The arterial road system will be developed to an all-weather standard.
4.5.11 Applicable to All Developed Recreation Analysis Area 55 (Courtright/Wishon Reservoirs) (S&G) #294	Maintain primitive and semi-primitive motorized and non-motorized recreation by closing roads to general two-wheel traffic upon project activity completion.
4.5.13 Applicable to All Dispersed Recreation Analysis Areas in Management Areas 2 and 11 (S&G) #303	Maintain semi-primitive recreation opportunities where they now occur by closing roads, except designated OHV routes, immediately following project activities.
4.5.13 Applicable to All Dispersed Recreation Analysis Areas in Management Areas 2 and 11 (S&G) #304	Where possible, increase the acreage of primitive and semi-primitive recreation by closing unneeded local roads.
4.5.13 Applicable to All Dispersed Recreation Analysis Areas in Management Areas 2 and 11 (S&G) #306	Designate four-wheel drive and trail-bike route termini at popular lake and stream locations. These termini will normally be a minimum of 300 feet to a maximum of ¼ mile from the attraction and will have parking facilities with vehicle controls.
4.5.15 Applicable to All Timber Analysis Areas in Management Area 4 (S&G) #314	Close unneeded local roads to public use. Consider these roads for possible designation as OHV routes prior to closure.
4.5.16 Applicable for Analysis Areas 22 and 49 in Management Area 4 (S&G) #317	<p>Establishes a 200-foot zone on each side of all reaches of tributaries to Portuguese and Cow Creeks where Lahontan cutthroat trout currently occur (January 1, 1989) on all Class I, II and III tributaries above those reaches. Apply the following standards within this zone:</p> <ul style="list-style-type: none"> c. No motor vehicles will be allowed off permanent roads, except as authorized by permit or contract.

4.5.21 Applicable for Analysis Area 61 in Management Area 9 (S&G) #324	Close roads not necessary for administrative purposes in the area south of Rancheria Creek to maintain integrity of the Spanish Lakes OHV route.
4.5.23 Applicable to All Front Country Analysis Areas in Management Area 5 (S&G) #326	Close unneeded roads to motorized use to establish more area for hiking, horseback riding, four-wheel drive, trailbike use and other forms of recreation not normally associated with areas easily accessed by two-wheel drive.

Additional Direction

In addition to the LRMP there are several other sources of direction that are important to this analysis:

SNF 1977 Off-Road Vehicle (ORV) Plan

The 1977 ORV Plan developed management by three areas: open use, limited use and non-use (USDA-FS 1977). Open use was defined as area and trails which are suitable for ORV use, restricted only by operating conditions set forth in the Code of Federal Regulations. Limited use was defined as areas and trails which are suitable for ORV use under specified controls. Non-use was defined as areas and trail which are not suitable for ORV use because of adverse impacts or legislative constraints.

Sierra Nevada Forest Plan Amendment (SNFPA)

The forest wide management standards and guidelines (S&G) in the Record of Decision (ROD) (USDA-FS 2004a: pp.62 – 66) for the 2004 Sierra Nevada Forest Plan Amendment applicable to motorized travel management established the direction to prohibit motor vehicle travel off of designated routes, trails and limited off-highway vehicle (OHV) areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines, cross-country travel by over-snow vehicles would continue.

California Wilderness Act (1984)

The 1984 California Wilderness Act established a 600-foot corridor for a primitive road (Dusy Ershim OHV route) adjacent to the John Muir Wilderness.

Regional Forester Direction

Regional Forester's letters file code 7700/2350, dated 08/26/06, 06/20/07 and 01/13/09 contain procedures National Forests in the Pacific Southwest Region will use to evaluate safety aspects of public travel on roads when proposed changes to the NFTS will allow both highway-legal and non-highway legal traffic on a road (motorized mixed use).

3.1.7 Information on Other Resource Areas

The proposed action and alternatives do not propose actions affecting the resource areas below. However, a brief summary on why they are not included in Chapter 3 is provided based upon input received during scoping:

Wilderness

Actions proposed are in compliance with wilderness designations and the Wilderness Act of 1964 (establishing John Muir and Ansel Adams Wildernesses), Wilderness Act of 1976 (establishing Kaiser Wilderness) and the California Wilderness Act of 1984 (establishing the Dinkey Lakes Wilderness and additional acreage to the Ansel Adams and John Muir Wildernesses and established a 600 foot corridor adjacent to the John Muir Wilderness for a primitive road [Dusy Ershim]). These resources are not affected by the proposed action or the alternatives. Motorized activity continues to be prohibited in designated wilderness under all the alternatives.

Water Quality Management for Forest Lands in California (September 2000)

This document provides guidance for protecting water quality as directed by the Central Valley Regional Water Quality Control Board (CVRWQB) (USDA-FS 2000).

Best Management Practices (BMPs) are the practices, procedures and program that are in conformance with and comply with the provisions and requirements of Sections 208 and 319 of the Federal Clean Water Act (PL 92-500) and the United States Environmental Protection Agency (EPA) guidance. They are also within the guidelines of the Water Quality Control Board (Basin Plans) developed by the nine RWQCBs in the State.

Pursuant to Section 208 of the Clean Water Act, all agencies responsible for carrying out any portion of a State Water Quality Management Plan must be designated as a Water Quality Management Agency (WQMA). Through the execution of a formal Management Agency Agreement (MAA) with the Forest Service in 1981, the California State Water Quality Control Board (SWOCB) has designated the Forest Service as the WQMA for NFS lands in California.

3.2 Transportation Facilities

3.2.1 Introduction

This section of the environmental analysis discloses the effects of the five alternatives on management and maintenance of the roads and motorized trails (i.e., transportation facilities) which make up the National Forest Transportation System (NFTS or system). It addresses the extent to which the alternatives respond to direction related to transportation facilities established in the LRMP and the Travel Management Rule. It also considers whether alternative proposals to add new facilities to the NFTS or make changes to the existing NFTS provide adequate public safety, and result in a sustainable, affordable system.

The LRMP transportation facilities direction was established under the implementing regulations of the National Forest Management Act (NFMA) and the Forest Roads and Trails Act (FRTA). The NFTS consists of roads, trails and areas. The NFTS provides for protection, development, management and utilization of resources on the National Forests. There are other roads and trails existing on the SNF that are not part of the NFTS such as State and county public roads, private roads, permittee roads, and Federal Energy Regulatory Commission (FERC) licensee roads. Transportation facilities considered in this analysis include roads, trails and areas that are suitable for motor vehicle use. Decisions regarding changes in the transportation facilities must consider the following measurement indicators: 1) provide for adequate public safety and 2) provide adequate maintenance of roads, trails and areas that will be designated for public use. The analysis in this section focuses primarily on these two aspects of the NFTS.

Regulatory Framework: Compliance with the LRMP and Other Regulatory Direction

Direction relevant to the proposed action as it affects transportation facilities includes:

Travel Management Rule, Subpart B (36 CFR 212)

The responsible official shall consider the effects of designated roads, trails and areas on public safety, access needs, conflicts among uses of National Forest lands, the need for maintenance of roads, trails and areas and the availability of resources for that maintenance and administration of roads, trails and areas.

For the designation of roads, trails and areas, the responsible official shall consider minimizing damage to soil, watershed, vegetation and other forest resources and minimizing conflicts among different classes of motor vehicles use on NFS lands and neighboring Federal lands.

For the designation of roads, the responsible official shall consider the speed, volume, composition and distribution of traffic and the compatibility of vehicle class with road geometry and road surfacing.

Forest Service Manual Sections 2350 and 7700 contain Agency policy for management of the NFTS. The policy requires the development of trail management objectives (TMO) and road management objectives (RMO). The TMOs and RMOs document the purpose of each trail or road, and how management will meet the designated purpose for the transportation facilities. The purpose for the trail or road sets the parameters for maintenance standards needed to meet user needs, resource protection and public safety. Forest Service Handbook 2309.18 describes the technical guidelines for the survey, design, construction, maintenance and assessment of NFTS trails to meet TMOs including considerations for public safety. Forest Service Handbook 7709.58

describes the road maintenance management system the Forest Service uses and the maintenance standards needed to meet RMOs including considerations for public safety.

Regional Forester's Letters, file code 7700/2350, dated 08/26/06, 06/20/07 and 01/13/09 contain procedures National Forests in the Pacific Southwest Region will use to evaluate safety aspects of public travel on roads when proposed changes to the NFTS will allow both highway-legal and non-highway legal traffic on a road (motorized mixed use).

California Vehicle Code (CVC) regulates the use of motor vehicles in California, including motor vehicles used on the National Forests. The CVC sets safety standards for motor vehicles and vehicle operators. It defines the safety equipment needed for highway-legal and non-highway legal vehicles. Motor vehicle use on the SNF falls under the California Vehicle Code.

National Forest Management Act (NFMA), specifically for OHV management, requires this use be planned and implemented to protect land and other resources, promote public safety and minimize conflicts with other uses of the NFS lands. The NFMA also requires that a broad spectrum of forest and rangeland-related outdoor recreation opportunities be provided that respond to current and anticipated user demands.

Sierra Nevada Forest Plan Amendment (SNFPA) establishes the direction to prohibit motor vehicle travel off of designated routes, trails and areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines, cross-country travel by over-snow vehicles would continue.

Sierra National Forest Land and Resource Management Plan (LRMP) provides goals and objectives for the transportation facilities and requires a broad range of developed and dispersed recreation opportunities in balance with existing and future demands. In addition, the LRMP sets the Standards and Guidelines (S & G) to be used during the implementation of the Plan.

Effects Analysis Methodology

The Effects Analysis Methodology focuses on the assumptions and indicators measures for addressing the direct, indirect and cumulative effects of implementation of each of the alternatives. To present the conclusions of the analysis in the environmental consequences section, the direct and indirect effects of implementing the alternative as a whole are displayed. The cumulative effects of this action are in combination with the effects of past, present and reasonably foreseeable future actions.

Transportation Specific Assumptions

1. Any motor vehicle use authorized by State law may take place on the NFTS unless there are SNF specific prohibitions. State law regulating motor vehicle drivers sets the standard of care for the safety of themselves and other users for traveling on the NFTS.
2. Motor vehicle use by special use permit or other permitted activities are outside the scope of this proposal (fuelwood gathering, motorized trail events and other activities under special use permit, commercial road use permit, license and mining activities).
3. There are two categories of roads open for motor vehicles on the SNF. They are roads "Open to Highway-legal Vehicles Only" and roads "Open to All Vehicles."
4. The Forest Service requires roads maintained for passenger cars to allow only highway registered vehicles and be operated by licensed drivers to follow all the provisions required under the California Vehicle Code (CVC) as a highway.

5. FS Pacific Southwest Region and California Highway Patrol (CHP) consider maintenance level two (ML2) roads maintained for high clearance vehicles as rough graded, and non-highway legal vehicle use is consistent with State law under CVC Division 16.5.
6. All roads allowing a change in the intended use from passenger cars only to allow non-highway legal vehicles use require a motorized mixed use analysis. Each mixed use analysis evaluated current use, past crash histories, right-of-way issues, road maintenance practices and general access needs. This process is accomplished by the Forest Qualified Traffic Engineer using *Guidelines for Engineering Analysis of Motorized Mixed Use on National Forest System Roads*.
7. Segments of passenger car roads may be designated for motorized mixed use under CVC 38026 (combined use) where an engineering analysis has been completed to inform the responsible official of any safety concerns. When Highway Safety Act roads are designated for mixed use, the following additional items are required under CVC 38026 for ATVs: operators must be licensed drivers; operators must have liability insurance; only operate during daytime; have an operational stop light; and have rubber tires. The mixed use under CVC 38026 evaluations required a more thorough analysis due to the primary use vehicle on these roads are standard highway-legal vehicles operated by licensed drivers, and the normal driver does not expect to encounter ATV traffic. This process is also accomplished by the Forest Qualified Traffic Engineer using *Guidelines for Engineering Analysis of Motorized Mixed Use on National Forest System Roads*.
8. There are three classes of vehicle for use on motorized trails. They are: 1) high clearance vehicles (four-wheel drive vehicles greater than 50" wide), 2) ATVs (vehicles less than 50" wide) and 3) motorcycles. Low clearance highway-legal vehicles are not prohibited on motorized trails; however, user discretion is advised via signing.
9. Neither the SNF road or motorized trail budgets are expected to increase appreciably in the foreseeable future; however, the SNF will continue to apply for State grants to help maintain and manage roads and motorized trails.

Data Sources

1. LRMP road management guidelines
2. Title 36 Code of Federal Regulations, Section 212, Subpart B
3. SNF Estimated Costs for Road Maintenance
4. SNF Estimated Costs for Trail Maintenance

Transportation Facility Indicator Measures

Public safety and transportation system affordability (annual maintenance and implementation cost) are the two important factors which distinguish the overall effects of each of the five alternatives to the transportation facility. The measures and their indicators are described below. Indicator measures are intended to address how each alternative as the sum total of its proposed actions respond to the LRMP, significant issues identified in scoping and Subpart B of the Travel Management Rule.

Measurement Indicator 1: Public Safety

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: Cross-country motor vehicle travel area (Figure 1-3)

Indicators: Public Safety

Rationale: The effects measurement indicator is based on NFMA and Travel Management Rule requirements, compliance with Forest Service manual policies, the CVC and significant issues raised during internal and public scoping.

Description: This effects measurement indicator looks at the impacts of proposed changes to the NFTS from a public motor vehicle safety perspective.

Method: Safety conflicts between passenger cars and non-highway legal vehicles may affect the public operational safety on various roads and motorized trails. These concerns arise as the expectations of drivers and operators of various vehicles may differ greatly. Potential conflicts on ML 2, rough graded roads between licensed highway drivers and ATV/Quad operators could occur. CVC Division 16.5 allows under age operators to use green/red sticker vehicles.

Of particular concern is the conflict between licensed highway drivers and green/sticker operators on roads maintained for passenger cars under the Highway Safety Act. In this case CVC 38026 allows green/red sticker (ATV) operators to use these road segments if they are designated safe by the Forest Service and California Highway Patrol. In additions, the ATV operators must have a regular drivers license, must has extra safety devices and only operate during day light.

Traffic safety concerns for roads to be designated as mixed use under CVC Division 16.5 are evaluated by an Engineering Judgment by the Forest Qualified Engineer. Roads to be operated under both the Highway Safety Act and CVC 38036 are informed by an Engineering Report which is prepared by the Forest Qualified Engineer and approved by the Regional Office.

There are ways of minimizing some of the conflicts including roadside brushing, surface scarifying, safety signing and direct education. The detailed discussion of the traffic options can be found in Appendix I.

Measurement Indicator 2: Affordability

Short-term timeframe: 1 year

Long-term timeframe: 20 years.

Spatial boundary: Cross-country motor vehicle travel area (Figure 1-3)

Indicators: Costs

Rationale: The proposed additions and changes to the NFTS are evaluated for their effects on affordability. Both the expected annual costs of maintaining the NFTS and the initial implementation costs are evaluated. Continuing annual costs include routine costs to maintain the road and trail system to standard over a long period of time. One time initial implementation costs are the costs required to bring the transportation system to its operating level the first time.

Roads converted to motorized trails, as well as unauthorized routes added as motorized trails, typically have characteristics and conditions that match the vehicle class specified. This includes width, roughness and recreation experiential attributes. Designation as a road or motorized trail will ensure that future management and maintenance activities will maintain desired characteristics over time.

It would be expected that there will be nominal costs for putting a road or trail into service since most of the travelways being considered are already receiving traffic similar to that being

proposed for permanent use. Most of the necessary work involves protecting natural and cultural resources including work such as drainage structures, tread padding, signing, tread armoring and protection barriers.

Description: This measurement indicator looks at the operation, maintenance and administration costs of proposed changes of the designated NFTS.

Method: The proposed additions and changes to the NFTS are evaluated for their effects on affordability. Both the expected initial implementation costs and the annual costs of maintaining the NFTS are evaluated. In addition, the effects on the SNF backlog of work needed to be done on the transportation system are evaluated.

All costs are the expense of having the work accomplished through a public works contract and utilizing 2009 dollars as an economy analysis. This baseline level allows for a uniform comparison of the alternatives. Any work accomplished by Forest Service employees or volunteers will provide a savings for the American taxpayer.

The costs associated with the initial work to put the road or motorized trail system into service is the implementation cost. These costs may be for improving unauthorized routes that will be added to the NFTS, costs for safety and resource protection or the costs for changing maintenance levels. Implementation costs also include signing of restricted unauthorized motorized areas and route. The implementation costs have been derived from an estimate of the cost of the necessary work activities specified to put the road and trail system into service. In addition, the cost of generating the MVUM is considered.

The annual cost for the transportation system is the recurrent maintenance costs to maintain the facility to its operational standard. These costs include maintaining the travel way, repairing resource damage and assuring safe public access. The total costs for the transportation system is estimated on the probable assignment of maintenance levels during the implementation phase. It is very difficult to separate the cost of maintaining the road system for recreation from other uses such as general administrative access, timber and silviculture needs, fire and fuels requirements, hydro power generation and other motorized uses of the NF lands and transportation system. An analysis for each of the uses on the NFTS is beyond the scope of this analysis. However, the cost difference between the alternatives best displays the effects of annual maintenance cost for the transportation system as a result of the proposed.

In addition to implementation costs and annual costs, there are deferred maintenance costs for road and trail work which had been put off until it is more economically efficient to accomplish the work or there is sufficient funding. Examples include asphalt repair, surface replacement, road side brushing, minor erosion control and sign repair. Typically, deferred maintenance is work which does not immediately compromise safety, resource protection or infrastructure preservation.

Deferred maintenance needs for roads on the SNF are currently estimated to be \$10,900,000 and the deferred maintenance backlog for motorized trails is approximately \$96,000. The road estimate is from current local knowledge of roads and the National random sample of deferred maintenance needs completed in 2008. The National sample is only statistically significant for the entire National Forest Road System and is only a statistical projection of deferred maintenance road needs for the individual National Forests.

Deferred maintenance of roads is difficult to predict since it is usually predicated on the ability of annual budgets to keep up with road conditions. Future funding levels are difficult to predict. Road maintenance is prioritized each year depending on the budget and road conditions. When a new road is added to the NFTS, it creates more competition for maintenance resources. Since the budget may not change much, it can be assumed that increased needs for additional maintenance

funds would be unmet. The new annual cost of maintaining an individual road is a good measure of its affect on the accumulated unmet deferred maintenance need. Thus changes on the rate of change in the unmet deferred maintenance needs would be the change in expected annual maintenance costs.

As with roads, trail systems accumulate deferred maintenance when maintenance needs are put off into the future. The users of motorized trails are much more accepting of differing conditions and safety and resource concerns are addressed in a timely manner usually by volunteer OHV groups. However, some work items must be deferred. The trail maintenance budget includes all FS trail needs such as motorized, equestrian and hiking trails.

3.2.2 Affected Environment

Affected environment and environmental consequences for this travel management analysis are an aggregate of the entire SNF. The assessment for the transportation facilities does not vary between the analysis units.

Roads

Most of the road network in and around the SNF was created in support of timber harvest activities beginning as far back as the late 1800s. A resurgence of timber harvest in the early 1960s through the late 1980s resulted in access roads into many new areas of the forest. Much of the road system was upgraded through timber sales and hydroelectric projects to support additional multiple uses including safe public access.

Public use of the road system has grown steadily. In 1950, the nationwide average ratio of recreation to timber traffic on Forest Service roads was 10 to 1. In 1975, the ratio was 27 to 1 and in 1996, the ratio was estimated at 114 to 1. Driving for pleasure has become the single largest motorized recreation use of NFS lands. Almost all National Forest visitors travel on NFTS roads. The roads provide access for motorized and non-motorized recreation, research, fish and wildlife habitat management, grazing, cultural and historical activities, timber harvesting, hunting and fishing, fire suppression, fuels reduction, mining, insect and disease control, watershed management, commercial and private special uses, and access to private land. There are several road networks which provide varying degrees of access and connectivity to and within the SNF. They are described below.

State Highways and County roads are considered public roads. Public roads are roads constructed and maintained by a public road agency such as a city, county or State. These roads are for public travel and fall under the National Highway Safety Act. The SNF is within easy driving distance of the Fresno, Madera and Mariposa metropolitan areas, and within three hours of Stockton or Bakersfield. Three major access routes are State Highway 41 and State Highway 140, accessing the northern half of the forest, and State Highway 168, accessing the southern half. State Highway 49 connects Highway 41 to Highway 140 and crosses through small areas of the Forest. There are 325 miles of State Highways on or near the SNF. The SNF lies in the jurisdiction of three different counties and each county has a selection of roads within or near the SNF boundaries. There are 200 miles of Fresno county roads in the southern half of the SNF and 200 miles of county roads combined for Madera and Mariposa counties in the northern half of the forest.

NFTS Roads have been, and are, developed, managed and maintained for the utilization of NFS lands. Most areas where road access is needed for management in the foreseeable future have adequate roads. Road work is funded, for the most part, from appropriated funds through the U.S. Department of Interior budget. Commercial uses such as timber harvest and hydroelectric power generation are responsible for any road work required as a result of their activities on NF roads.

The Forest Service is responsible for the road maintenance required for recreational users. The Forest Service designates which roads are to be operated for passenger car use under the Federal Highway Safety Act and which roads are to be operated as rough graded for high clearance vehicles. The SNF allows green/red sticker use on rough graded roads under CVC Division 16.5. Though roads maintained for passenger cars fall under the Highway Safety Act, the SNF may allow limited ATV use under CVC 38026 on designated road segments.

Some NFTS roads have restricted travel at various times of the year in order to protect the infrastructure, assure safety and protect natural and cultural resources. Some roads are closed year-round in order to provide for the same protections as above. See Appendix A for a more detailed listing of the individual road restrictions and closures. Decisions and direction for individual road management is documented in Road Management Objectives (RMOs).

National Forest Special Use Roads are roads located within National Forest System lands which have been built and are maintained by authorized permits or licenses. Some of these roads are for the use of commercial entities such as utility companies. Some are for access to private in-holdings or access to organizational camps. These roads are managed by the permit holder for themselves and their customers and are not open to the public. The SNF manages approximately 180 miles of this type of road.

Private roads are roads on private lands for which the Forest Service does not have a right-of-way. These roads are maintained by the land owner and access is at the discretion of the land owner. The Forest Service does not direct visitors to these roads. There are approximately 150 miles of private road within the SNF excluding those in developed areas such as Oakhurst, North Fork and Shaver Lake.

Other Federal agencies have roads connecting to the Sierra NFTS including the National Park Service, the Bureau of Land Management, Army Corps of Engineers and the Bureau of Indian Affairs. Approximately 5 miles of roads on the SNF are managed by other Federal agencies.

Motorized Trails

NFTS roads are for the utilization of NFS lands. However, if a motorized travelway is used exclusively for a motorized recreational experience (such as rock crawling, driving specialized trail equipment or negotiating challenging terrain) it is classified as a NFTS motorized trail. The SNF maintains and manages the motorized trail system for a range of recreational uses and experiences. The management and maintenance for the motorized trail system is funded through, and the responsibility of, the recreation trails program. The FS trails program includes all recreation trails: hiking, equestrian, bicycle, snowmobile, cross-country ski, motorcycles, ATVs and 4WD vehicles. Motorized trails on the SNF are categorized for three different classes of vehicles:

1. Open to All Vehicles, typically standard four wheel drives,
2. Open to Vehicles less than 50" wide, typically quads and ATVs, and
3. Open to Motorcycles only.

There are currently 56 miles of motorized trails (see Table 3- 1). These trails are maintained through a combination of Federal appropriated funds, State OHV Commission grants and volunteer partnerships. These funds assist in keeping these opportunities open and maintained for public recreational use.

Table 3- 1. Existing Motorized Trails

Motorized Trail	Trail Number	Length (miles)
Hite Cove	19E200	4.3
Onion Springs	22E223	2.1
Star Lakes	22E203	2.8
Green Mountain	22E206	1.5
Cattle Mountain	22E207	2.9
Red Top	23E205	1.4
Iron Lakes	22E204	0.7
Red Mountain	26E213	1.9
Coyote Lake	26E212	2.2
West Lake	26E215	0.2
Strawberry Lake	26E214	2.3
Mirror Lake	26E216	1.4
Mirror Lake Spur	26E217	0.1
Brewer Lake	26E218	3.0
Bow Tie	22E208	3.0
Bow Tie Spur A	22E209	0.7
Bow Tie Spur B	22E210	1.2
Bald Mountain	26E219	3.8
Bald Mountain Spur	26E211	2.2
Swamp Lake	26E221	12.5
Swamp Lake Access	26E220	0.2
Grouse Lake Spur		0.1
Spanish Mountain	26E224	5.0
Middle Bridge ATV	21E201	0.4
Lower Miami ATV	021E202	0.5
Total		56.4

There are situations when a road is not needed continually as a road, but may provide good recreational experiences. These travelways are captured in the INFRA database and managed as both a road and a trail. Most of the time these roads are managed as a recreational motorized trail; however, when it is needed as a road, it is temporarily converted back to that use. Once its use as a road is no longer necessary, it is converted back to a motorized trail. The Dusy-Ershim OHV trail has been defined as a road in the Wilderness Act though it has always been operated as a motorized trail. The SNF has 41.2 miles of roads managed as motorized trails.

Table 3- 2 Existing Roads Managed as Motorized Trails

Road Managed as Motorized Trail	Road Number	Length (miles)
Shuteye	06S059	2.7
Bear Diversion	06S083	3.0
Dusy-Ershim	07S032	33.0
Hooper Diversion	07S065	2.5
Total		41.2

Areas

There are an estimated 1,700 dispersed recreation sites on the SNF. These sites are scattered throughout the project area. The sites are accessed by existing roads and unauthorized routes. The

creation of these sites vary from old log landings to sites used as overflow camping near developed campgrounds to staging areas for loading and unloading of horses or ATVs. There are a few areas used for motorized recreation play areas; usually these play areas are granitic outcrops or domes which provide a variety of rock crawling and scenic view opportunities (see the Recreation section for more details).

3.2.3 Environmental Consequences, Summary of Effects Analysis across All Alternatives

When a road, trail or area is added to the system, it is assigned a Road Management Objective (RMO) or a Trail Management Objective (TMO), which defines the level of development, maintenance and management the facility will receive. Since appropriated funds can only be spent on NFTS facilities, adding unauthorized roads, trails or areas to the NFTS offers the opportunity for management and maintenance. Guided by management objectives, appropriate structural improvements can be installed which will reduce or eliminate natural resource effects like erosion and provide the driver or rider with a more enjoyable experience. Structural improvements may include drainage structures, safety devices or travelway/tread retention structures.

For assessing the effects of changes to the current NFTS or the additions to the NFTS, two indicator measures have been identified: safety and affordability. The individual and collective evaluations of roads allowing mixed use analyze the relative concerns for vehicle conflict safety on NFTS roads. Individual safety assessments for roads considered the changes in their non-highway designation and how the designation meets the goals for each alternative. Individual summaries of each traffic option may be found in Appendix I.

The mileage for each class of vehicle is useful in assessing any change in costs for implementing and maintaining NFTS. A summary of the changes to the NFTS may be found in Table 3- 3.

Table 3- 3. Summary of the NFTS by Alternative

(Miles)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Roads converted to "Highway-legal Vehicles Only" from Mixed Use	0	12	0	7	7
Roads allowing Combined Use under CVC 38026	0	0	0	0	17
Road converted to Mixed Use from "Highway-legal Vehicles Only"	0	12	0	25	125
Roads converted to trails > 50"	0	7	0	9	12
Roads converted to trails < 50"	0	6	0	6	7
Unauthorized routes added as roads	0	6	0	9	15
Unauthorized routes added as trails	0	40	0	42	70
Roads converted to closed to all vehicles	0	209	0	281	196
Open motorized areas added (acres)	0	6	0	37	113

The implementation costs include the cost of putting a road or trail into service. This includes resource mitigation work, safety and informational signing, and producing the MVUM. Table 3-4 displays a summary of the estimated implementation costs for each alternative.

Table 3- 4. Estimated Implementation Costs (\$1000)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Passenger car roads reduced to high clearance road	0	3	0	3	3
Passenger car roads to be operated as motorized mixed use under CVC 38026	0	0	0	0	30
Roads converted to motorized trails	0	5	0	5	5
Implementing closures	20	30	35	50	30
Unauthorized routes added as roads	0	36	0	55	85
Unauthorized routes added as trails	0	328	0	293	629
Cost of implementing MVUM	75	75	75	75	75
Total Implementation Costs	\$95	\$477	\$110	\$481	\$857

Routine facility maintenance activities have a positive cumulative effect on the stability of roads, trails and areas. Routine maintenance activities include clearing obstacles, cleaning and reconstructing water diversion structures, and repairing structures to protect resources such as hardened approaches to water crossings, bridges and barriers for closures. The annual maintenance costs are predicated on the cost of continually keeping the entire road, motorized trail and area system up to the standard for its long-term use.

The SNF receives approximately \$425,000 annually to operate and maintain NFTS roads. Table 3- 5 shows funding needed to maintain roads to standard. This current budget allows the SNF road maintenance crew to respond to urgent and emergency road repairs. The Forest seldom can afford to repair road problems unless it is a hazard or is creating resource damage. Maintenance such as non-emergency road-side brushing, pavement rehabilitation and surface blading are often deferred to the future.

The SNF receives approximately \$100,000 for maintenance of 1,100 miles of NFTS non-motorized and motorized trails. In addition, \$44,000 is received for motorized trail maintenance as a result of an agreement with the State of California, Department of Parks and Recreation.

Table 3- 5. Estimated Annual Maintenance Costs (\$1000/year)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
NFTS Roads	1,669	1,692	1,699	1,668	1,700
NFTS Motorized Trails	86	95	49	99	130
Annual Costs	\$1,755	\$1,787	\$1,748	\$1,767	\$1,830

In addition to implementation costs and annual costs, there are deferred maintenance costs for road and trail work which had been put off until it is more economically efficient to accomplish the work. This includes such work as asphalt repair, rock replacement, road side brushing, minor

erosion control and sign repair. Typically, deferred maintenance is work which does not immediately compromise safety, resource protection or infrastructure preservation (Table 3- 6).

Table 3- 6. Estimated Deferred Maintenance (\$1000/year)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
NFTS Roads	10,900	10,924	10,900	10,902	10,935
NFTS Motorized Trails	96	95	50	100	125
Deferred Maintenance	\$10,996	\$11,019	\$10,950	\$11,002	\$11,060

One proposed action does not affect the transportation consequences in any quantifiable or non-quantifiable measure. Changing the S&G #22 and SPNM ROS Element Map has a minimal effect to the affordability or safety of the NFTS. This minimal effect is consistent between all the alternatives and therefore are not evaluated or discussed further in the consequences to the transportation system.

The effects of each of the other actions are documented below.

Alternative 1 – No Action

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The Travel Management Rule would not be implemented and cross-country travel would not be prohibited in areas where it is currently allowed. Motorized cross-country travel would continue with a probable increase in the number of unauthorized motorized recreation routes.

There would be no management of these routes and no Federal transportation funds available to correct damage and deficiencies caused by unauthorized cross-country travel. There would be no changes in the funding needs for the NFTS. Since these unauthorized routes would not be expected to support passenger car use, there would be no additional mixed use conflicts between passenger cars and non-highway legal vehicles.

Additions to the NFTS

There would be no roads, trails or areas added to the NFTS. Current maintenance and deferred maintenance cost would not change due to new transportation facilities. There would be no changes to public safety concerns between passenger cars and non-highway legal vehicles.

Changes to the NFTS

Allowable uses on NFTS roads would continue under the previously approved 1998 Road Closure Plan. The 1998 Closure Plan is out of conformance with the current LRMP as amended, which requires the consideration of new science and conditions in order to apply improved restriction measures to protect natural and cultural resources.

The current traffic designations would continue to incur a small amount of mixed use safety conflicts as there will continue to be some confusion by drivers and operators as to how the roads are operated. Since there have been no recorded mixed use crashes for over 15 years, there would not be expected to be a change in the number of mixed use crashes as a result of this alternative.

Non-Significant LRMP Amendments

This alternative does not change S&G #17 and would continue to allow motorized use of maintenance level one (ML 1) roads in violation of National Forest Service policy and direction.

There would be no effects on the either affordability or traffic safety.

Cumulative Effects

The NFTS will continue as currently designated; thus there would be no changes in the affordability and safety of road and trails.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The Travel Management Rule would be implemented and cross-country travel would be prohibited in areas where it is currently allowed. Federal road and trail funds would be available to correct damage and deficiencies caused to the previously unauthorized routes added to the NFTS. Since the unauthorized routes would not support passenger cars there would be no change in the safety of the NFTS.

Additions to the NFTS

There would be an increase of 6 miles of roads and 40 miles of motorized trails and 6 acres of motorized area added to the NFTS. Alternative 2 will initially cost \$477,000 to implement and increase the annual maintenance needs by approximately 1.8 percent. There would be no changes to public safety concerns between passenger cars and non-highway legal vehicles since all these additional roads and trails would be open for high clearance and non-highway legal vehicle use, and not maintained for passenger car use.

Changes to the NFTS

The 1998 Road Closure Plan would be replaced with a motorized travel management plan which considers current science and conditions, and conforms to the Sierra LRMP as amended and to all Forest Service policies and direction.

Changes to the existing NFTS will increase the necessary annual maintenance requirement by 1.8 percent. Changes in the traffic rules from “Highway-legal vehicles Only” to “Open to All Vehicles” have be evaluated in an engineering judgment and do not increase the risk of crashes between passenger cars and green/red sticker vehicles.

Non-Significant LRMP Amendments

This alternative would amend S&G #17 and no longer allow motorized use of maintenance level one (ML 1) roads and thus conform to National Forest Service policy and direction.

Cumulative Effects

It is expected motorized trails will receive grants and volunteer work to keep the trails properly maintained. However, unmet deferred maintenance on roads would increase approximately 0.2 percent. There would not be any expectation of a change in system wide traffic safety.

Alternative 3

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The Travel Management Rule would be implemented and cross-country travel would be prohibited in areas where it is currently allowed.

Further use of unauthorized routes would not be legal; however, there would be no Federal transportation funds available to correct damage and deficiencies caused by previous cross-country travel. There would be no changes in the funding needs for the NFTS. Since these routes would not be expected to support passenger car use, there would be no additional mixed use conflicts between passenger cars and non-highway legal vehicles.

Additions to the NFTS

There would be no roads, trails or areas added to the NFTS. Annual maintenance costs would not change due to new transportation facilities. There would be no changes to public safety concerns between passenger cars and non-highway legal vehicles.

Changes to the NFTS

Allowable uses on NFTS roads would continue under the previously approved 1998 Road Closure Plan. The 1998 Closure Plan is out of conformance with the current LRMP as amended, which requires the consideration of new science and conditions in order to apply improved restriction measures to protect natural and cultural resources.

Changes to the existing NFTS will decrease the necessary annual maintenance requirement by 2.1 percent. The current traffic designations would continue to incur a small amount of mixed use safety conflicts as there will continue to be some confusion by drivers and operators as to how the roads are operated. Since there have been no recorded mixed use crashes for over 15 years, there would not be expected to be a change in the number of mixed use crashes as a result of this alternative.

Non-Significant LRMP Amendments

This alternative does change S&G #17 and would bring the Sierra NFTS into compliance with National Forest Service policy and direction.

There would be no effects on the either affordability or traffic safety.

Cumulative Effects

The NFTS will continue as currently designated; thus there would be no changes in the affordability and safety of road and trails.

Alternative 4

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The Travel Management Rule would be implemented and cross-country travel would be prohibited in areas where it is currently allowed. Federal road and trail funds would be available to correct damage and deficiencies caused to the previously unauthorized routes added to the NFTS. Since the unauthorized routes would not support passenger cars, there would be no change in the safety of the NFTS.

Additions to the NFTS

There would be an increase of 9 miles of roads and 42 miles of motorized trails and 37 acres of motorized areas added to the NFTS. Alternative 4 will initially cost \$481,000 to implement and increase the annual maintenance needs by approximately 0.7 percent. The bulk of the increase is due to the addition of 42 miles of motorized trails. There would be no changes to public safety concerns between passenger cars and non-highway legal vehicles since all these additional roads and trails would be open for high clearance and non-highways legal vehicle use, and not maintained for passenger car use.

Changes to the NFTS

The 1998 Road Closure Plan would be replaced with a motorized travel management plan which considers current science and conditions, and conforms to the Sierra LRMP as amended and to all Forest Service policies and direction.

Changes to the existing NFTS will increase the necessary annual maintenance requirement by 0.7 percent. The reduction in cost from roads changing for highway-legal vehicle only to open to all vehicles is offset by the inclusion for previously closed roads to open to all vehicles. Most of the increase is due to changing 91 miles of roads to motorized trails.

Changes in the traffic rules from “Highway-legal vehicles Only” to “Open to All Vehicles” have been evaluated in an engineering judgment and do not increase the risk of crashes between passenger cars and green/red sticker vehicles.

Non-Significant LRMP Amendments

This alternative would amend S&G #17 and no longer allow motorized use of maintenance level one (ML 1) roads and thus bring the LRMP into conformance with National Forest Service policy and direction.

Cumulative Effects

It is expected motorized trails will receive grants and volunteer work to keep the trails properly maintained. However, unmet deferred maintenance on roads would increase less than 0.1 percent. There would not be any expectation of a change in system wide traffic safety.

Alternative 5

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The Travel Management Rule would be implemented and cross-country travel would be prohibited in areas where it is currently allowed. Federal road and trail funds would be available to correct damage and deficiencies caused to the previously unauthorized routes added to the NFTS. Since the unauthorized routes would not support passenger cars there would be no change in the safety of the NFTS.

Additions to the NFTS

There would be an increase of 15 miles of roads and 70 miles of motorized trails and 113 acres of motorized areas added to the NFTS. Alternative 5 will initially cost \$857,000 to implement and increase the annual maintenance needs by approximately 4.3 percent. There would be no changes to public safety concerns between passenger cars and non-highway legal vehicles since all these additional roads and trails would be open for high clearance and non-highways legal vehicle use, and not maintained for passenger car use.

Change to the NFTS

The 1998 Road Closure Plan would be replaced with a motorized travel management plan which considers current science and conditions, and conforms to the Sierra LRMP as amended and to all Forest Service policies and direction.

Changes to the existing NFTS will increase the necessary annual maintenance requirement by 4.3 percent. The major increase in cost is due to the addition of 190 miles of previously closed roads to allow all vehicles to use. These roads previously received little maintenance and would now be maintained. However, most of the cost increase is due to changing 91 miles of roads to motorized trails.

Changes in the traffic rules from “Highway-legal vehicles Only” to “Open to All Vehicles” have been evaluated in an engineering judgment and do not increase the risk of crashes between passenger cars and green/red sticker vehicles. Fifty (50) miles of passenger car roads are proposed to allow motorized mixed use under CVC 38026. Engineering Reports have been completed by the Forest Qualified Engineer and the 50 miles are considered to be acceptable and will not compromise traffic safety.

Non-Significant LRMP Amendments

This alternative would amend S&G #17 and no longer allow motorized use of maintenance level one (ML 1) roads and thus bring the LRMP into conformance with National Forest Service policy and direction.

Cumulative Effects

It is expected motorized trails will receive grants and volunteer work to keep the trails properly maintained. However, unmet deferred maintenance on roads would increase 0.6 percent. There would not be any expectation of a change in system wide traffic safety.

3.2.4 Compliance with the LRMP, Travel Management Rule and Other Regulatory Direction

Alternative 1 does not implement the Travel Management Rule (36 CFR 212, 251, 261 and 295). Alternatives 2, 3, 4 and 5 do implement the Travel Management Rule.

Alternatives 1 and 3 do not change the LRMP Standard and Guideline #17 and LRMP continues to be counter to Forest Service policy and direction to close all maintenance level one roads to motorized travel. Alternative 2, 4 and 5 do amend Standard and Guideline #17 bringing the SNF in line with NF policy and direction, and no longer allow motorized use of maintenance level one roads. All alternatives (except Alternatives 1 and 3) comply to all other LRMP, Travel Management Rule and other policies, regulations and direction, including National and Regional direction for mixed use traffic safety.

3.3 Recreation Resources

3.3.1 Introduction

Nearly all SNF visitors, regardless of the purpose for their visit, use the motorized transportation system to reach their destination. Making changes to the NFTS (e.g. adding facilities, prohibiting or allowing motor vehicle use by vehicle type or season of use) changes the diversity of motorized and non-motorized opportunities on the SNF. These visitors may be participating in motorized recreation or utilizing motor vehicles to access trailheads, facilities, destinations or geographic areas that are utilized for non-motorized recreational activities. This section of the Travel Management FEIS examines the extent to which the diversity of recreation opportunities are affected by the proposed action and alternatives and the extent to which alternatives are consistent with direction established in the LRMP, the Sierra Nevada Forest Plan Amendment (SNFPA) and the Travel Management Rule.

Sierra National Forest LRMP Recreation Opportunity Spectrum

The LRMP provides goals for the recreation resource and requires a broad range of developed and dispersed recreation opportunities in balance with existing and future demand. For management and conceptual convenience, possible mixes or combinations of activities, settings and probable experience opportunities have been arranged along a spectrum or continuum. This continuum is called the Recreation Opportunity Spectrum (ROS) and planning for recreation opportunities using the ROS is conducted as part of Land and Resource Management Planning. The ROS provides a framework for defining the types of outdoor recreation the public might desire and identifies that portion of the spectrum a given National Forest might be able to provide. ROS is divided into six classes: Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Rural and Urban.

The LRMP uses the ROS to define desired future conditions (USDA-FS 1991; Section 4.3.3, page 4-3); to establish recreation settings for a number of management prescriptions (pages 4-9 through 4-12); as forestwide standards and guidelines to maintain acreages in each ROS class (see S&G 22); to establish Management Area program emphasis (pages 4-38 through 4-56); and in defining monitoring and evaluation requirements (see page 5-4). The current ROS classes for the NF were mapped as part of the development of the LRMP in the mid 1980s. The current distribution of ROS classes is shown on the LRMP map, "Recreation Opportunity Class Objective Map" (USDA-FS 1991). The ROS boundaries shown on this map were digitized and used in the following analysis. The breakdowns of ROS classes on the SNF are demonstrated in Table 3- 7.

Table 3- 7. Sierra National Forest ROS Classes

ROS Class	Acre ¹	Percent of SNF
Primitive	500,800	37
Semi-Primitive Non-Motorized	110,500	8
Semi-Primitive Motorized	60,800	5
Roaded Natural	548,700	41
Rural	124,800	9
Urban	90	0

¹Source: Recreation Opportunity Class Objective Map, LRMP

Effects Analysis Methodology

Impacts Relevant to Recreation Include

1. The compatibility of proposed changes to the NFTS with LRMP recreation and OHV management prescriptions and ROS.
2. The impact of proposed changes to the NFTS on non-motorized (i.e., quiet) recreation (dust, noise, use conflicts).
3. The amount and diversity of motorized recreation opportunity.
4. The amount of motorized access to dispersed recreation.
5. The impact of proposed changes to the NFTS on neighboring private and Federal lands (dust, noise, use conflicts).
6. Impacts to natural and cultural resources.

Assumptions Specific to Recreation Analysis

1. The prohibition of cross-country travel is not a change to ROS (Semi-primitive Motorized for example); it is simply a prohibition within that ROS 'zone' for motorized travel off of designated facilities.
2. The change from an open to cross-country travel condition to a cross-country travel prohibited condition will reduce the availability of acreage for both motorized recreation as well as motorized access to dispersed recreation activities.
3. The change from an open to cross-country travel condition to a cross-country travel prohibited condition will increase the availability of acreage for non-motorized recreation as well as non-motorized access to dispersed recreation activities.
4. Proposed additions to the NFTS will have a beneficial effect on motorized recreation opportunities by providing a variety of trail riding experiences and increasing the amount of motorized recreation opportunities (loops and connectors).
5. The SNF National Visitor Use Monitoring (NVUM) report accurately expresses the most popular motorized and non-motorized recreation activities for use in this analysis.
6. Overall changes in the NFTS that require recreation-related non-significant LRMP amendment(s) will result in corresponding changes in the net Semi-primitive Non-motorized ROS class acres available on the SNF.
7. The area of influence (dust, noise) of motorized use on populated areas or quiet recreation opportunities is 1/2 mile from associated boundaries (e.g. wilderness, Research Natural Areas, property line, urban limit line).
8. The majority of the motorized public use occurring on NFS land is occurring within the NFTS based on observation.
9. Each unauthorized route added to the NFTS as a road is for the purpose of accessing dispersed recreation. In addition, there are unauthorized routes added to the NFTS as motorized trails for the purpose of accessing dispersed recreation. In many instances, multiple sites may be accessed through the addition of these routes to the system.
10. Impacts to natural and cultural resources will be analyzed in their respective sections.

Data Sources

1. LRMP for distribution of ROS classes
2. National Visitor Use Monitoring Results
3. GIS for data queries (ROS)
4. Sierra National Forest 1977 Off-Road Vehicle Plan

Recreation Indicator Measures

Indicator measures are intended to address how each alternative as the sum total of its proposed actions respond to the LRMP, significant issues identified in scoping and Subpart B of the Travel Management Rule: whether the motorized recreation opportunity conflicts with other recreation opportunities, specifically non-motorized opportunities; the proximity of motor vehicle use to populated areas or neighboring private and Federal lands; the quality of the motorized recreation experience; and the quality of motorized access to dispersed areas for both motorized and non-motorized uses. It also responds to the diversity of motorized access available on the SNF.

For analyzing the effects of changes to the NFTS by vehicle class and season of use, as well as the addition of unauthorized routes to the NFTS as roads, indicator measures were used. Mileage available for each class of vehicle is useful in analyzing the ability of NFS visitors to travel around the forest and enjoy motorized recreation opportunities and access non-motorized recreation opportunities, such as trailheads and dispersed recreation activities (hunting, fishing and camping). The SNF has determined that access to these opportunities is important based on both NVUM data and public scoping for this project. Mileage for motorized recreation is an indicator of the number and types of experiences available for motorcycles, ATVs and four-wheel drive vehicles in each alternative. The changes to motorized mileages can be used to interpret the level of change in opportunities for motorized and non-motorized visitors. Proposed seasonal closures relate the months that motorized recreation will not be allowed on designated roads, trails or areas and, thus minimizing conflicts between motorized and non-motorized uses during certain times of the year. Also, the effect on non-motorized recreation activities that are accessed by native surface roads is considered. Number of acres located 1/2 mile away from roads, trails and boundaries are used to analyze the opportunity for non-motorized and quiet recreation on the SNF. Finally, to determine the amount of dispersed recreation access provided under each alternative, a method was applied that assumed a minimum of one site is accessed by each road or motorized trail (in many instances multiple sites are accessed, but one site is used as a proxy).

Measurement Indicator 1: ROS Compatibility

Description: This measurement indicator looks at the impact of proposed changes to the NFTS on ROS.

Method: Number of ROS acres in each class under each alternative and number of required non-significant ROS LRMP amendments (and or any associated changes to LRMP recreation and motor vehicle use management prescriptions) displayed by associated acreage changes in the LRMP by alternative. Note the minor changes in Primitive, Semi-Primitive Non-Motorized, and Semi-Primitive Motorized as compared with Table 3- 7.

Table 3- 8. Number of ROS Acres in Each Class by Alternative

ROS Class	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Primitive	500,800	500,800	500,800	500,800	500,800
Semi-Primitive Non-Motorized	110,500	109,988	110,500	104,927	104,927
Semi-Primitive Motorized	60,800	61,312	60,800	66,373	66,373
Roaded Natural	548,700	548,700	548,700	548,700	548,700
Rural	124,800	124,800	124,800	124,800	124,800
Urban	90	90	90	90	90

*A non-significant ROS LRMP amendment is a component of Alternatives 2, 4, and 5.

Measurement Indicator 2: Non-motorized Recreation Opportunity

Description: This measurement indicator looks at the impact of proposed additions and changes to the NFTS on non-motorized recreation (dust, noise, use conflicts). It also addresses the opportunity for quiet recreation issue.

Method: Number of acres outside 1/2 mile of an area where motorized use is allowed (designated roads, trails and areas in the NFTS that would result under each alternative). This method was determined through a literature review of sound studies and reports. These include (1) Martin (2005) “California Off-Highway Vehicle Noise Study: A Report to the California Legislature as Required by Public Resources Code Section 5090.32 (0);” (2) Pilcher and Turina (2006) “Protecting Natural Sounds in National Parks: Soundscape Workshop Visitor Experience and Soundscapes;” and (3) Ouren et al (2007), “Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands: A Literature Synthesis, Annotated bibliographies, Extensive Bibliographies and Internet Resources.”

To compare the opportunities for recreational experiences beyond the immediate influence of roads or motorized trails in each alternative, a 1/2 mile buffer was applied to all roads and motorized trails and the acreage outside of this buffer calculated. This buffer was selected in part because California noise limits require off-highway vehicles manufactured after January 1, 1998 to be no louder than 96 decibels at a distance of 20 inches. At 1/4 mile, the 96 decibels is perceived by non-motorized recreationists as a level comparable to rural residential areas. If one considers additional noise reduction due to varied topography and the presence of dense vegetation, the perception of 96 decibels at 1/4 mile drops to approximately the level of comfortable conversation. The 1/2 mile buffer used for the analysis represents an estimate of the limits of severe engine noise impacts and provides a reference point to enable the comparison of the different alternatives.

Historically the SNF has been zoned for motor vehicles access (1977 ORV Plan) and would not be considered as an area for quiet recreation. The data for Alternative 1 is based on continuing cross-country travel in the area identified in Figure 1-3.

Table 3- 9. Acreage Outside 1/2 mile of Proposed Additions to the NFTS as a Measurement Indicator of Acreage Available for Quiet Recreation and Non-Motorized Activities without the Potential for Use Conflicts with Motor Vehicles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Acreage Available	32,980	70,988	71,063	70,677	70,395
Total Mileage in Alternative	0	44	0	51	85

Measurement Indicator 3: Motorized Recreation Opportunity

The LRMP identifies a goal to provide a broad range of recreation opportunities in accord with identified needs and demands (USDA-FS 1991, p. 4-1). Public comment and motorized participation rates clearly indicate a need for a wide range of opportunities. Providing sufficient mileage of roads and motorized trails to meet current and expected motorized needs is important to the success of any motorized transportation system.

Motorized trails offer a unique motorized recreation opportunity. Public comment from off-highway vehicle recreationists indicated a demand for designated motorized trail opportunities for full size vehicles and trails less than 50 inches wide for ATV quads and motorcycles.

In addition, public comment was received identifying the impacts to natural and cultural resources. These comments requested specific unauthorized routes to not be part of the designated system.

This measurement indicator responds to proposals in the alternatives to add currently unauthorized routes to the NFTS and make changes to the NFTS (for example vehicle class and seasons of use). Seasons of use are, for the most part, designed to provide for the habitat needs of sensitive species.

Description: This measurement indicator looks at the impact of proposed changes to the NFTS to motorized recreation opportunities by alternative.

Method:

Areas: Number of acres available by vehicle class and season of use.

Roads: Number of miles available by vehicle class and season of use.

Trails: Number of miles available by vehicle class and season of use.

Quality of Trail Experience: Number of miles by Trail class and degree of difficulty.

Table 3- 10. Road Mileage Open to the Public Forestwide by Alternative (Class of Vehicle and Season of Use)

Class of Vehicle	Season of Use		Alt 1 and 3 (miles)	Alt 2 (miles)	Alt 4 (miles)	Alt 5 (miles)
	From	To				
Open to All Vehicles	Year-round		1402.3	804.0	280.4	294.8
Open to Highway-legal Vehicles Only	Year-round		365.3	251.2	101.4	170.1
Closed to All Vehicles	Year-round		236.0	446.0	552.0	418.3
Open to All Vehicles	1-Apr	1-Jan	6.4	6.4	18.7	19.4
Open to Highway-legal Vehicles Only	1-Apr	1-Jan	12.2	12.2	0.4	0.4
Open to All Vehicles	1-Apr	1-Dec	9.6	0.0	0.0	0.0
Open to Highway-legal Vehicles Only	1-Apr	1-Dec	16.2	0.0	0.0	0.0
Open to All Vehicles	1-Apr	1-Dec	0.0	18.8	0.0	0.0
Open to Highway-legal Vehicles Only	15-Apr	1-Nov	0.0	0.4	0.0	0.0
Open to All Vehicles	15-Apr	15-Dec	0.0	3.8	0.0	0.0
Open to All Vehicles	20-Apr	12-Jan	0.0	0.6	0.0	0.0
Open to All Vehicles	20-Apr	1-Oct	15.2	0.0	0.0	0.0
Open to All Vehicles	20-Apr	1-Oct	0.0	0.8	0.0	0.0
Open to All Vehicles	20-Apr	1-Nov	0.5	0.0	0.0	0.0

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Class of Vehicle	Season of Use		Alt 1 and 3 (miles)	Alt 2 (miles)	Alt 4 (miles)	Alt 5 (miles)
	From	To				
Open to All Vehicles	20-Apr	1-Dec	0.0	167.5	0.0	0.0
Open to Highway-legal Vehicles Only	20-Apr	1-Dec	0.0	63.7	0.0	0.0
Open to All Vehicles	20-Apr	1-Dec	55.7	43.0	0.0	0.0
Open to Highway-legal Vehicles Only	20-Apr	1-Dec	87.1	64.2	0.0	0.0
Open to All Vehicles	1-May	1-Nov	0.0	0.6	0.0	0.0
Open to Highway-legal Vehicles Only	1-May	1-Nov	0.0	1.7	0.0	0.0
Open to Highway-legal Vehicles Only	1-May	15-Nov	0.0	0.7	0.0	0.0
Open to All Vehicles	1-May	1-Dec	52.4	53.6	739.9	819.5
Open to Highway-legal Vehicles Only	1-May	1-Dec	12.5	16.0	235.1	167.3
Open to All Vehicles	1-May	15-Dec	0.0	0.0	11.7	12.0
Open to Highway-legal Vehicles Only	1-May	15-Dec	0.0	0.0	11.2	11.2
Open to Highway-legal Vehicles Only	15-May	15-Sep	0.2	0.0	0.0	0.0
Open to Highway-legal Vehicles Only	15-May	1-Oct	0.0	0.8	0.0	0.0
Open to Highway-legal Vehicles Only	20-May	1-Apr	0.0	0.0	3.5	3.5
Open to All Vehicles	20-May	1-Oct	1.9	0.0	0.0	0.0
Open to All Vehicles	20-May	1-Oct	0.0	1.2	0.0	0.0
Open to Highway-legal Vehicles Only	20-May	1-Oct	0.0	0.6	0.0	0.0
Open to All Vehicles	20-May	15-Oct	0.0	0.9	0.0	0.0
Open to All Vehicles	20-May	1-Nov	22.8	6.9	0.0	0.0
Open to Highway-legal Vehicles Only	20-May	1-Nov	3.6	0.0	0.0	0.0
Open to All Vehicles	20-May	15-Nov	0.0	5.9	0.0	0.0
Open to Highway-legal Vehicles Only	20-May	15-Nov	0.0	29.8	0.0	0.0
Open to All Vehicles	20-May	1-Dec	8.1	214.4	211.6	221.7
Open to Highway-legal Vehicles Only	20-May	1-Dec	23.4	80.6	76.4	76.4
Open to Highway-legal Vehicles Only	30-May	15-Sep	0.0	5.2	0.0	0.0
Open to All Vehicles	30-May	1-Nov	31.0	0.0	0.0	0.0
Open to Highway-legal Vehicles Only	30-May	15-Nov	0.0	0.0	28.6	28.6
Open to All Vehicles	1-Jun	1-Apr	0.0	0.1	0.0	0.0
Open to All Vehicles	1-Jun	15-Nov	5.9	2.2	11.6	11.6
Open to All Vehicles	1-Jun	1-Dec	0.0	0.5	0.0	0.0
Open to All Vehicles	15-Jun	1-May	1.3	0.1	0.1	0.1
Open to Highway-legal Vehicles Only	15-Jun	1-May	3.7	3.7	5.0	5.0
Open to All Vehicles	15-Jun	15-Sep	2.6	0.0	0.0	0.0
Open to All Vehicles	15-Jun	1-Oct	6.6	73.1	90.4	90.9

Class of Vehicle	Season of Use		Alt 1 and 3 (miles)	Alt 2 (miles)	Alt 4 (miles)	Alt 5 (miles)
	From	To				
Open to Highway-legal Vehicles Only	15-Jun	1-Oct	0.0	0.0	2.0	2.0
Open to All Vehicles	15-Jun	1-Nov	0.0	0.2	3.7	3.7
Open to All Vehicles	15-Jun	15-Nov	0.0	2.5	0.0	0.0
Open to All Vehicles	15-Jun	1-Dec	0.0	2.0	0.0	0.0
Open to All Vehicles	20-Jun	1-Oct	0.0	0.3	0.0	0.0
Open to Highway-legal Vehicles Only	20-Jun	1-Oct	0.0	2.0	0.0	0.0
Open to All Vehicles	30-Jun	1-Oct	11.7	0.0	17.7	17.7
Open to All Vehicles	1-Jul	15-Sep	5.6	0.0	0.0	0.0
Open to All Vehicles	1-Jul	1-Oct	2.5	0.0	0.0	0.0
Open to All Vehicles	1-Jul	15-Oct	0.0	1.4	0.0	0.0
Open to All Vehicles	1-Jul	15-Oct	4.5	4.5	0.0	0.0
Open to All Vehicles	1-Jul	1-Nov	4.0	4.0	0.2	0.2
Open to All Vehicles	1-Jul	1-Dec	0.0	1.5	0.0	0.0
Open to All Vehicles	15-Jul	1-Oct	0.0	2.2	0.0	0.0
Open to All Vehicles	15-Jul	1-Nov	0.0	29.3	0.0	0.0
Open to All Vehicles	15-Jul	1-Nov	2.2	0.0	0.0	0.0
Open to All Vehicles	15-Jul	15-Nov	0.0	1.6	0.0	0.0
Open to All Vehicles	31-Jul	1-Oct	0.0	1.0	5.3	6.6
Open to All Vehicles	31-Jul	1-Dec	0.0	1.8	0.0	0.0
Open to All Vehicles	1-Aug	1-May	1.2	0.0	0.0	0.0
Open to All Vehicles	1-Aug	1-Jul	3.9	1.6	1.6	2.9
Open to All Vehicles	1-Aug	1-Nov	0.0	0.0	30.1	30.1
Open to All Vehicles	1-Aug	1-Dec	0.0	0.8	0.0	0.0
Open to All Vehicles	15-Aug	1-Jan	0.0	0.0	0.0	1.0
Open to All Vehicles	15-Aug	1-Nov	0.0	0.1	0.4	0.4
Open to All Vehicles	15-Aug	1-Dec	5.2	7.1	16.3	40.3
Open to All Vehicles	1-Sep	1-Dec	0.0	0.0	0.0	4.0
Open to All Vehicles	15-Sep	1-Dec	0.0	0.4	0.0	0.4
Open to All Vehicles	30-Sep	1-Oct	0.0	3.2	0.0	0.0
Open to All Vehicles	30-Sep	1-Dec	0.0	2.5	0.0	0.0
Open to All Vehicles	30-Nov	1-Oct	23.2	0.0	0.0	0.0
Total			2446.4	2451.4	2455.1	2460.5

Table 3- 11. Trail Mileage Open to the Public Forestwide by Alternative (Class of Vehicle and Season of use)

Class of Vehicle	Season of Use		Alt 1 & Alt 3	Alt 2	Alt 4	Alt 5
	From	To				
Trail Open to Vehicles 50" or less	Open Year-round		0.0	0.0	1.0	1.0
Trail Open to Vehicles 50" or less	2-Apr	30-Nov	0.0	7.4	0.0	0.0
Trail Open to All Trail Vehicles	2-Apr	30-Nov	0.0	0.8	0.0	0.0
Trail Open to Motorcycles Only	2-Apr	30-Nov	0.0	0.4	0.0	0.0
Trail Open to All Trail Vehicles	21-Apr	30-Nov	7.5	7.5	0.0	0.0
Trail Open to All Trail Vehicles	2-May	30-Nov	12.4	16.9	24.0	34.7
Trail Open to Vehicles 50" or less	2-May	30-Nov	0.5	9.6	20.9	33.0
Trail Open to Motorcycles Only	2-May	30-Nov	0.0	0.5	1.7	3.8
Trail Open to All Trail Vehicles	21-May	30-Nov	8.0	21.2	18.4	12.8
Trail Open to Vehicles 50" or less	21-May	30-Nov	0.0	0.8	0.7	0.7
Trail Open to All Trail Vehicles	21-May	31-Mar	0.0	0.0	3.8	0.4
Trail Open to All Trail Vehicles	31-May	31-Mar	0.0	0.6	0.0	3.8
Trail Open to All Trail Vehicles	31-May	15-Nov	11.0	0.0	2.1	2.1
Trail Open to All Trail Vehicles	31-May	30-Nov	0.0	8.8	0.0	7.3
Trail Open to All Trail Vehicles	2-Jun	30-Oct	11.0	0.0	0.0	0.0
Trail Open to All Trail Vehicles	16-Jun	30-Oct	17.8	13.0	11.5	11.5
Trail Open to All Trail Vehicles	2-Jul	30-Oct	0.0	0.0	13.0	13.0
Trail Open to All Trail Vehicles	2-Aug	30-Oct	0.0	5.0	5.0	5.0
Trail Open to Vehicles 50" or less	16-Aug	30-Nov	0.0	5.1	3.5	6.1
Trail Open to All Trail Vehicles	16-Aug	30-Nov	0.0	1.8	1.5	2.4
Trail Open to Motorcycles Only	16-Aug	30-Nov	0.0	0.7	1.1	2.4
Trail Open to All Trail Vehicles	2-Sep	30-Nov	0.0	0.3	0.0	0.0
Trail Open to Motorcycles Only	2-Sep	30-Nov	0.0	0.8	0.0	0.0
Total			57	103	108	139

Table 3- 12. Trail Mileage Open to the Public Forestwide by Alternative by Degree of Difficulty

Class of Vehicle	Degree of Difficulty	Alt 1 & Alt 3	Alt 2	Alt 4	Alt 5
Trail Open to Vehicles 50" or less	Easy	0.5	17.4	19.2	30.9
	More Difficult	0.0	7.7	6.0	8.4
	Most Difficult	0.0	1.0	0.9	1.4
Sub-Total		0.5	26.1	26.1	40.7
Trail Open to Motorcycles Only	Easy	0.0	1.3	0.0	2.1
	More Difficult	0.0	1.0	1.8	3.1
	Most Difficult	0.0	0.0	1.0	1.0
Sub-Total		0.0	2.4	2.8	6.2
Trail Open to All Trail Vehicles	Easy	17.4	1.5	35.7	46.7
	More Difficult	22.5	26.9	27.5	29.0
	Most Difficult	15.8	17.3	16.3	17.1
Sub-Total		55.7	75.7	79.5	92.8
Total Mileage per Alternative		57	103	108	139

Table 3- 13. Area Acreage Added Forestwide by Alternative by Vehicle Class

Season of Use	Vehicle Class	Alt 2	Alt 4	Alt 5
May 2 to November 30	Open to All Trail Vehicles	0.0	3.2	3.2
May 2 to November 30	Open to Highway-legal Vehicles Only	6.1	7.1	10.7
May 21 to November 30	Open to Highway-legal Vehicles Only	0.0	3.5	3.5
May 31 to November 14	Open to Highway-legal Vehicles Only	0.0	0.3	2.3
August 16 to November 30	Open to All Trail Vehicles	0.0	21.3	82.2
August 16 to November 30	Open to Highway-legal Vehicles Only	0.0	1.7	2.5
Year-round	Open to Highway-legal Vehicles	0.0	0.1	0.1

Measurement Indicator 4: Motorized Access to Dispersed Recreation

Use of NFTS roads and motorized trails is both a primary and secondary recreation activity. For example, driving for pleasure is a primary activity and providing access to trailheads, campgrounds, and day-use sites a secondary recreation activity. Dispersed recreation activities (i.e., activities that occur after the motor vehicle stops such as camping, hunting, fishing, hiking, etc.) are not part of the scope of the proposed action. The action and the analysis focus on motor vehicle use. The dispersed recreation sites are scattered throughout the project area. A majority of the sites are accessed by existing NFTS roads. The creation of these sites vary from an old landing area in a timber sale to a site used as overflow camping when developed campgrounds are at capacity, to a staging area for loading and unloading horses or ATVs. There are a few sites that are utilized as an opportunity for motorized recreation and are often a granitic outcrop or dome. These areas provide various challenges for rock crawling or access to scenic views.

Description: This measurement indicator looks at the impact of proposed changes to the NFTS to motorized access to dispersed recreation opportunities by alternative.

Method:

Roads: Number of miles available by vehicle class and season of use.

Quality of Road/Dispersed Experience: Number of dispersed sites accessed. In some instances multiple sites are accessed by a single facility addition.

Trails: Number of miles available by vehicle class and season of use.

Table 3- 14. Number of Dispersed Recreation Sites Accessed by Proposed Additions to the NFTS by Alternative

	Alt 1		Alt 2		Alt 3		Alt 4		Alt 5	
	#	Acres								
Areas	1,327	697	241	375	240	369	251	406	260	474

In Alternative 1 there are no additions to the NFTS proposed. The number shown is an estimate.

Measurement Indicator 5: Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (dust, noise and use impacts)

Description: This measurement indicator looks at the impact of proposed changes to the NFTS on neighboring private and Federal lands (dust, noise and use conflicts) by alternative.

Method: Number of miles of new roads and motorized trails proposed within 1/2 miles of populated areas, neighboring Federal land boundaries, wilderness boundaries and private land boundaries (acts as surrogate to indicate how much conflict with NFTS may occur by alternative). This method was determined through a literature review of sound studies and reports. These include (1) Martin (2005) “California Off-Highway Vehicle Noise Study: A Report to the California Legislature as Required by Public Resources Code Section 5090.32 (0);” (2) Pilcher and Turina (2006) “Protecting Natural Sounds in National Parks: Soundscape Workshop Visitor Experience and Soundscapes;” and (3) Ouren et al (2007), “Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands: A Literature Synthesis, Annotated bibliographies, Extensive Bibliographies and Internet Resources.”

The intent of comparing the miles of roads and motorized trail within 1/2 mile of developed recreation sites, neighboring populated areas, wilderness boundaries and private land boundaries is to capture the effect of recreational vehicle noise on these locations. As stated above, at 1/4 mile, 96 decibels will be perceived as no louder than a rural residential area. At distances less than 1/4 mile, noise levels increase with a corresponding increase in the potential for effect on and conflict with occupants of these areas. The 1/2 mile buffer used for the analysis represents an estimate of the limits of severe engine noise impacts and provides a reference point to enable the comparison of the different alternatives.

Alternative 1 is not proposing additions to the NFTS, however for comparison there are 208 miles of unauthorized routes (2005 inventory) within 1/2 mile of neighboring private and Federal lands.

Table 3- 15. Miles of Proposed Additions to the NFTS within 1/2 Mile of Neighboring Private and Federal Lands by Alternative

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Unauthorized Route Additions within 1/2 mile	0	19	0	12	26
Total Mileage in Alternative	0	44	0	51	85

Recreation Resources Methodology by Action

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel

Short-term time frame: 1 year.

Long-term time frame: 20 years.

Spatial boundary: The spatial boundary for analysis is identified in Figure 1-2 Project Area. This was used when considering effects associated with changes in the NFTS or season of use.

Indicators: (1) The compatibility of proposed changes to the NFTS with LRMP recreation and OHV management prescriptions and ROS; (2) The impact of proposed changes to the NFTS on non-motorized (i.e., quiet) recreation (dust, noise, use conflicts); (3) The amount and diversity of motorized recreation opportunity by alternative; (4) The

amount of motorized access to dispersed recreation by alternative; (5) The impact on neighboring private and federal lands (dust, noise, use conflicts).

Rationale: The effects measurement indicators are based on NFMA and Travel Management Rule requirements as well as significant issues raised during internal and public scoping.

2. Direct and indirect effects of adding facilities to the NFTS including identifying seasons of use and vehicle class

Short-term time frame: 1 year.

Long-term time frame: 20 years.

Spatial boundary: The spatial boundary for analysis is identified in Figure 1-2 Project Area. This was used when considering effects associated with changes in the NFTS or season of use.

Indicators: (1) The compatibility of proposed changes to the NFTS with LRMP recreation and OHV management prescriptions and ROS; (2) The impact of proposed changes to the NFTS on non-motorized (i.e., quiet) recreation (dust, noise, use conflicts); (3) The amount and diversity of motorized recreation opportunity by alternative; (4) The amount of motorized access to dispersed recreation by alternative; (5) The impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

Rationale: The effects measurement indicators are based on NFMA and Travel Management Rule requirements as well as significant issues raised during internal and public scoping.

3. Direct and indirect effects of changes to the NFTS including identifying seasons of use and vehicle class

Short-term time frame: 1 year.

Long-term time frame: 20 years.

Spatial boundary: The spatial boundary for analysis is identified in Figure 1-2 Project Area. This was used when considering effects associated with changes in the NFTS or season of use.

Indicators: (1) The compatibility of proposed changes to the NFTS with LRMP recreation and OHV management prescriptions and ROS; (2) The impact of proposed changes to the NFTS on non-motorized (i.e., quiet) recreation (dust, noise, use conflicts); (3) The amount and diversity of motorized recreation opportunity by alternative; (4) The amount of motorized access to dispersed recreation by alternative; (5) The impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

Rationale: The effects measurement indicators are based on NFMA and Travel Management Rule requirements as well as significant issues raised during internal and public scoping.

4. Cumulative Effects

Short-term time frame: not applicable; cumulative effects analysis will be done only for the long-term timeframe.

Long-term timeframe: 20 years

Spatial boundary: The SNF boundary is the unit of spatial analysis for determining cumulative effects.

Indicators: (1) The compatibility of proposed changes to the NFTS with LRMP recreation and OHV management prescriptions and ROS; (2) The impact of proposed changes to the NFTS on non-motorized (i.e., quiet) recreation (dust, noise, use conflicts); (3) The amount and diversity of motorized recreation opportunity by alternative; (4) The amount of motorized access to dispersed recreation by alternative; (5) The impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

Rationale: The effects measurement indicators are based on NFMA and Travel Management Rule requirements as well as significant issues raised during internal and public scoping

3.3.2 Affected Environment

The Affected Environment section is project-wide and covers all analysis units.

The SNF is located in Fresno, Madera and Mariposa Counties in the State of California. The SNF is bordered on the west by private property in the eastern foothills of the San Joaquin Valley, on the north by Yosemite National Park and Stanislaus National Forest, and on the east and south by Inyo National Forest, Sequoia-Kings Canyon National Park and Sequoia National Forest.

The SNF is within a 1-hour drive from Madera or Fresno, a 3-hour drive from Stockton or Bakersfield, and a 6-hour drive from San Francisco or Los Angeles. The communities of Shaver Lake, Big Creek, North Fork, and Bass Lake are located within the SNF boundary. About 95,725 acres of private lands (such as Southern California Edison, Pacific Gas and Electric and residential areas) occur within the project area.

From lakeside camping and picnicking to wilderness solitude, the SNF is popular for destination recreation. With intensely used and highly developed lakes and the Ansel Adams and John Muir Wildernesses, the Sierra provides the extreme ends of recreation settings. These sharp contrasts provide destinations for visitors to escape from the intensity of urban life and to connect with nature, family and friends.

Developed recreation sites consist of campgrounds, picnic sites, trailheads, and boat launches. These recreation sites are distributed along State Highways and NFTS roads. These sites are at elevations ranging from 1,500 feet to over 8,200 feet.

The major recreation activities in the summer and fall are primarily dispersed recreation: driving for pleasure, camping, picnicking, fishing, boating, horseback riding, hiking, viewing wildlife and hunting. Visitors to the SNF who enjoy these activities primarily park in an area without vegetation off the road. Dispersed recreation is where a visitor parks or “stages” in an area to access recreation. The visitor may recreate quite a distance from the staging area (hunting, fishing, and boating) or near the vehicle as in camping or preparation of a horse for riding. There are over a thousand such parking and staging areas across the SNF.

Driving for pleasure has increased over the years. In 2002, 9.9 percent of the visitors participated in driving for pleasure and in 2007, 13.6 percent participated. The roads provide visitor access to all types of developed and dispersed recreation. Driving on NFTS roads provides different experiences depending on the road chosen to travel. Popular paved driving and scenic corridors, two of which are designated as National Forest Scenic Byways, are the conduit for connecting people from low elevation, urban settings to cool, high elevation quiet. These corridors provide dramatic geologic, historic and vegetative contrasts including an intimate experience with Giant

Sequoias, and take visitors from the surrounding lowlands at sea level to over 9,000 feet elevation.

Recreation Visitor Use

Visitor counts relating to motorized use were not documented in the 1977 ORV Plan. However, through the National Visitor Use Monitoring (NVUM) process, the SNF has data relating to these visitors. Most SNF visitors reside in Fresno, Madera, Merced or Mariposa counties and drive less than 75 miles to their destination on the SNF. Table 3- 16 describes the type of recreation activities SNF visitors reported participating in during the 2002 and 2007 surveys. Again, the reader should be cautioned to assume use trends based on these data, as (1) the survey methods changed between 2002 and 2007, (2) fewer total visitors in 2007, and (3) in 2007 there was a greater margin of error in the data (USDA-FS 2008).

Table 3- 16. Forest Visitor Activity Participation and Primary Activity As Reported In NVUM Results (2002 and 2007)

Activity	Percent of Visitors who Participated in this Activity ¹	
	FY ² 2002	FY 2007
Camping in developed sites	35.6	11.6
Primitive camping	2.1	2.0
Backpacking	6.0	3.6
Resort Use	5.4	3.9
Picnicking	22.6	20.6
Viewing wildlife, birds, fish, etc	26.9	21.6
Viewing natural features (scenery)	32.4	51.3
Visiting historic/prehistoric sites	7.0	4.8
Visiting a nature center	3.6	2.9
Nature Study	6.2	7.6
Relaxing	43.2	48.7
Fishing	22.8	12.3
Hunting	1.3	0.0
OHV use	3.4	1.6
Driving for pleasure	9.9	13.6
Snowmobile travel	0.5	1.2
Motorized water travel	7.1	6.6
Other motorized activities	0.6	0.9
Hiking or walking	41.2	40.5
Horseback riding	0.8	1.4
Bicycling	4.4	3.0
Non-motorized water travel	12.0	4.4
Downhill skiing or snowboarding	10.3	9.4
X-C skiing, snow shoeing	3.2	2.8
Other non-motor activity (swim, etc.)	22.9	43.8
Gathering forest products mushrooms, berries, firewood	5.3	4.3
Motorized trail Activity		0.8
No Activity Reported	13.9	4.1

¹Survey respondents could select multiple activities so this column may total more than 100 percent.

²The USDA Forest Service fiscal year (FY) begins October 1 and ends September 30.

It can be determined the number of visitors who spent some time driving for pleasure and/or used off-highway vehicles during their visit based on the reported number of visits to NFS lands on the SNF during fiscal year (FY) 2002 and 2007. It can also be determined the number of visitors who participated in off-highway vehicle use as their primary activity. Based upon the data, when primary motorized uses are combined, including: OHV use, driving for pleasure and other motorized activities, in FY 2002 14 percent of the visitors to the SNF responded they participated in motorized uses. In FY 2007 the data indicates there was a 26 percent reduction of primary motorized use on the SNF. Even with a reduction of primary motorized use on the SNF, the visitors participating in the survey, 17 percent responded they participated in motorized uses.

There are a number of visitors who spent some time in non-motorized uses, such as backpacking, fishing, hiking, walking, horseback riding, and bicycling. In FY 2002, 98 percent of the visitors to the SNF responded the main reason they came to the SNF was to participate in non-motorized uses. In FY 2007 participation in non-motorized activities was reported as 105 percent (See Table 3- 17 and associated footnote). Use of a motor vehicle is the primary form of access to non-motorized recreation activities on the SNF.

Table 3- 17. Approximate Forest Visitors by Type of Main Activity as Reported in NVUM Results (2002 and 2007)

Type of Use	NVUM Categories	Percent as Main Activity 2002*	Approximate Visitors in 2002	Percent as Main Activity 2007*	Approximate Visitors in 2007
Camping	Developed Camping	35.5	660,384	11.6	132,182
	Primitive Camping	2.1	39,120	2.0	22,790
Hunting	Hunting	1.3	24,962	0.0	
Motorized Uses	OHV use	3.4	62,592	1.6	18,232
	Driving for Pleasure	9.9	184,609	13.6	154,972
	Other Motorized Activity	0.6	11,736	0.9	10,256
Non-motorized Uses	Backpacking	6.1	112,703	3.6	41,022
	Fishing	22.9	426,036	12.3	140,159
	Hiking/Walking	41.2	767,685	40.5	461,498
	Horseback Riding	0.8	15,648	1.4	15,953
	Bicycling	4.4	81,780	3.0	34,185
	Other Non-Motorized Activities	22.9	425,850	43.8	499,101
Other Activities	Resort Use	5.4	100,036	3.9	44,441
	Picnicking	22.6	420,820	20.6	234,737
	Viewing Natural Features	32.4	604,125	51.3	584,564
	Visiting Historic Sites	7.0	129,841	4.8	54,696
	Nature Center Activities	3.6	67,622	2.9	33,046
	Nature Study	6.2	116,056	7.6	86,602
	Relaxing	43.2	805,128	48.7	554,937
	Gathering Forest Products	5.3	98,918	4.3	48,999
Water Sports	Viewing Wildlife	26.9	501,668	21.6	246,132
	Motorized Water Activities	7.1	131,332	6.6	75,207
	Non-motorized Water	12.0	222,798	4.4	50,138
Winter Sports	Downhill Skiing	10.1	192,806	9.4	107,113
	Cross-country Skiing	3.2	59,984	2.8	31,906
	Snowmobiling	0.5	9,873	1.2	13,674

* Respondents were asked to select one activity as their main one; some selected more than one, so this column may total more than 100%.

Motorized Recreation

A majority of the road network on the SNF was created in support of timber harvest activities beginning in the late 1800s. A resurgence of timber harvest in the early 1960s through the late 1980s resulted in access roads for timber management into many new areas of the SNF. By the late 1980s most of the necessary timber-related access roads were in place and priorities were shifted to provide better public safety and access. Timber-related facilities and the extensive road network have created hundreds of facilities that are part of the NFTS road system. These facilities provide parking and staging for access to dispersed recreation. Public use of the road system has grown steadily. In recent years, motorized visitors have taken the opportunity to use timber-related access roads and skid trails as a source of recreation. In many cases, once a timber sale is complete, the public has used the non-system improvements (the skid trails or landings), as opposed to creating new cross-country routes.

Typical seasons of use vary across the SNF and depending on the onset and duration of snowfall, are mostly determined by elevational differences. For example, two roads in different terrain the McKinley Grove Road and Beasore Road close near the first of December due to snowfall. The roads reopen near the end of April. As stated in Chapter 2, current management of the NFTS is defined under the SNF 1998 Road Closure Plan and implemented by Forest Order R5-83-3. Implementation of the Closure Plan represents 447 miles of roads seasonally open, 1,763 miles of roads open year-round, and 236 miles of roads closed year-round.

The SNF has been used by motorized recreation visitors since the late 1940s. Four-wheel drive vehicles were the primary mode of off-highway travel. The SNF has had an OHV Plan since off-highway vehicle controls were first put into effect in 1958. The controls were adjusted and modified over the years between 1960 and 1976 to meet the changing conditions and needs. These controls were developed with the participation of the public and were helpful in allowing motor vehicle use, while at the same time providing necessary protection to the basic resources. In the early 1970s trail bikes, motorcycles and all-terrain vehicles became popular.

An Executive Order signed by President Nixon on February 8, 1972 directed all Federal land management agencies to prepare plans to “insure that the use of off-road vehicles on public lands will be controlled and directed to protect the resources of those lands and to minimize conflicts among the various visitors of those lands.” As a result of the 1972 Executive Order, the SNF began an environmental analysis which resulted in the 1977 ORV Plan. The plan identified an area limited to roads and “ORV trails” and an area identified as “open use.”

The California Wilderness Act of 1984 was passed by Congress in September 1984 and became Public Law 98-425. This Act established the Dinkey Lakes Wilderness and enlarged the John Muir Wilderness. This legislation had potential for impacting two “ORV trails” identified in the 1977 Plan; Coyote and Dusy-Ershim. The Act references the Dusy-Ershim as a primitive road.

In 1972 the State of California initiated a grants and agreements program to qualified applicants. Beginning in the 1980s, the SNF was successful in obtaining State funds to maintain the system identified in the 1977 ORV Plan as well as non-NFTS opportunities not eligible to be maintained with Federal appropriated funds. One area of non-NFTS opportunities is Miami Motorcycle Area. The area has been managed over the years using State of California Off-Highway Motor Vehicle Recreation Division funds. The objective of applying this funding in the Miami area was to encourage visitors to stay on identified routes and discourage motorized cross-country use. Using these funds, new unplanned routes and routes with negative resource issues were actively obliterated. In addition, State funds have assisted in monitoring soil conditions, performing routine maintenance and conducting resource inventories for sensitive plants and animals.

The SNF has 56 miles of motorized trails and 41 miles of primitive roads maintained as motorized trails. These opportunities are shown on the recreation visitor map as designated off-highway vehicle routes. There are directional signs to the beginning of the routes. These motorized trails and roads are popular with visitors due to the challenging rock crawling offered as well as the primitive camping experience. There are opportunities to travel over granitic domes and other trails are native surfaced with occasional boulders to traverse. Each motorized trail or primitive road has unique recreation experiences depending upon elevation and surface of the trail. These routes are maintained by volunteers in partnership with the SNF. Operations and maintenance on these routes is accomplished with funding assistance through a partnership with the State of California Off-Highway Motor Vehicle Division. The partnership with the State of California also funds 33 miles of unauthorized routes in the areas where cross-country motorized use is proposed to be prohibited. Of the 56 miles of motorized trails, two trails (8 percent) open in April, 12 trails (48 percent) open in May, and 11 trails (44 percent) open in June. A majority of the openings are weather dependent. Once the snow melts and drainage features move water off the trail, the trail is open for public use.

The NFTS roads open to non-highway legal vehicles provide an interconnecting network creating several miles of opportunity. It would be characterized as a semi-connected network. Just as there is a semi-connected network of unauthorized routes branching off the NFTS roads. There are currently approximately 605,000 acres open to cross-country motorized travel. Of the 560 miles of inventoried unauthorized routes, an estimated 471 miles are located in the acres open to cross-country motorized travel (2005 inventory). According to GIS analysis, 70 percent of all unauthorized routes are located in five predominate vicinities on the SNF. These general locations are: the Miami Motorcycle Area, the land in the area of Whiskey Falls, Texas Flat, Whiskers, Gags and Lower Chiquito campgrounds, Jose Basin, Blue Canyon, and Nelson Mountain – Big Fir Road areas.

Miami Motorcycle Area is located directly off of Highway 41. Miami Motorcycle Area began as a result of an approximately 4,500-acre timber harvest project and now provides recreational opportunities for dirt bikes, duel sport bikes and ATVs. The area is managed and is in compliance with the 1977 ORV Plan. Per the plan, the area is open to cross-country travel. However, the SNF identified 18 miles of motorcycle and ATV non-system trails and discourages cross-country travel. There are two main staging areas, Kamook and Lone Sequoia, servicing the area with picnic tables, fire rings, vault toilets and parking that includes room for unloading equipment. Though the SNF has identified the Miami Motorcycle Area on the official recreation map since 1991, there are visitors who have ridden the trails for 35 or more years. The loop and varied skill level opportunities for motorcycle and ATV recreation provides the most popular ATV and motorcycle riding opportunities on the SNF. Miami Motorcycle Area is located in the Westfall Analysis Unit. The Westfall Analysis Unit has 113 miles of unauthorized routes. There is a roaded experience in this area providing predominantly native surface experience with gentle to short steep slopes. There is opportunity for long riding experiences without repeating the segments and accesses a large existing road network

A few miles from the Miami Motorcycle Area, there are a few small campgrounds dotted through the area. Many motorized recreation visitors camp at developed campgrounds (Whiskey Falls, Texas Flat, Whiskers, Gags, Lower Chiquito and others) and ride the extensive network of system roads and unauthorized routes. There is extensive connectivity providing hours of riding. ATVs are the principal vehicle of choice in this area. The small campgrounds are located in the Gags Analysis Unit. The Gags Analysis Unit has 83 miles of unauthorized routes.

In Jose Basin, there is a network of roads and unauthorized routes as a result of previous timber harvesting. An annual permitted motorized event brings four-wheel drive enthusiasts together to test their skills on the rocks and routes in the area. There is a roaded experience in Jose Basin

providing predominantly natural surface experience with gentle to short steep slopes with occasional boulder areas for technical driving opportunities (rock crawling). Jose Basin is located in the Jose-Chawanakee Analysis Unit. The Jose-Chawanakee Analysis Unit has 22 miles of unauthorized routes.

In Blue Canyon, an annual permitted motorized event brings four-wheel drive enthusiast together to test their skill on short steep routes and challenging rock crawling. There is a roaded experience in Blue Canyon providing a natural surface with gentle to short steep slopes with occasional boulder areas to crawl over. Blue Canyon is located in the Dinkey-Kings Analysis Unit. The Dinkey-Kings Analysis Unit has 61 miles of unauthorized routes.

It should be noted that the motor vehicle use described in Jose Basin and Blue Canyon is authorized under special use permit. Use authorized under special use permits or other authorizations (permits, mining claims, and licenses) are analyzed in separate NEPA decisions and are outside the scope of this proposal.

Located northeast of the Blue Canyon area is the Nelson Mountain/Big Fir Road area. The routes in this area are a result of temporary roads and timber sales. The area began expanding as an overflow camping area as a result of Dinkey Creek, Buck Meadow and Gigantea campgrounds reaching capacity. In addition, this area is a camping and staging area for day rides over the Swamp OHV route. The Nelson Mountain/Big Fir Road area is located in the Tamarack-Dinkey Analysis Unit. The Tamarack-Dinkey Analysis Unit has 109 miles of unauthorized routes.

Areas

An 'area' is defined as a discrete, specifically delineated space that is smaller, and in most cases much smaller than a ranger district. Areas on the SNF are accessed by existing NFTS roads. The original creation of these sites vary from old landing areas in a timber sale to sites used as overflow camping when developed campgrounds are at capacity, to staging areas for loading/unloading horses or ATVs. There are a few sites that are utilized as an opportunity for motorized recreation and are often a granitic outcrop or dome. These areas provide various challenges for rock crawling or access to scenic views.

Currently the SNF is managing areas as managed recreation areas or as part of the managed transportation system. The SNF manages 59 dispersed recreation sites (approximately 124 acres) where motor vehicle use is allowed. Management activities (health and safety and resource protection) are primarily for resource protection rather than user convenience. An area may be as small as an individual parking area for access to camping or as large as a space for parking several vehicles with equestrian trailers. There are also a few areas open to motorized travel for all trail vehicles within the defined boundaries. Managed areas are not maintained daily, but require more labor intensive trash collection as trash collection bins are typically not present (see Appendix K - Maps). Specific information for the 59 managed recreation areas includes:

- 71 percent of these acres (8 sites) are located on Bald Mountain which has an NFTS motorized trail. Bald Mountain has areas of rock; sections of granitic dome with scattering of rock/boulder climbing challenges. There is scattered vegetation and occasional vista points. Of the acreage identified as Bald Mountain, 25 percent of the acres (3 areas) are parking areas.
- Approximately 17 percent of the acres (26 sites) are associated with campsites along the Coyote, Dusy-Ershim, Mirror, Red, Strawberry and Swamp NFTS motorized trails. Another 4 sites for 2.7 acres are used for parking and access to camping in the Miami Motorcycle Area

- Approximately 6 percent of the acres (13 sites) are near or part of a trailhead. These parking sites average less than 1 acre each and are for highway-legal vehicles only.
- Three sites (total 1.5 acres) are located off of Dinkey Creek Road in an area the locals call “Radio Camp.” This is an area where highway-legal vehicles can find a place to park to access the dispersed camping throughout this area.
- The five remaining sites (2.8 acres) are areas where highway-legal vehicles can park to access dispersed camping either along a boat ramp, a Native American Bear Dance location, and parking for single vehicles to access dispersed recreation.

The SNF also manages hundreds of areas as part of the transportation system. These facilities range from staging and parking areas to individual parking areas for access to camping. There are over 600 acres of parking facilities in the NFTS for highway-legal vehicles only. Specific information for the areas managed as transportation facilities are:

- 86 percent of these sites are less than 1 acre in size and are scattered across the SNF landscape. These sites are used for parking, predominately for visitors pulling a horse trailer.
- The remaining sites, though larger than 1 acre in size, are scattered across the SNF landscape. The sites are also used for parking. The larger sites allow more space between the parked vehicles or provide the access to the dispersed recreation activities nearby.

Non-Motorized Recreation

Non-motorized recreation consists of many of different types of experiences identified with quiet recreation. Quiet recreation is defined as muscle powered recreation, such as hiking, walking cross-country skiing, snowshoeing, wildlife and bird viewing, horseback riding, photography, fishing, and additional experiences. The SNF manages for solitude in the Ansel Adams, Dinkey Lakes, John Muir, Kaiser and Monarch Wildernesses. Vehicles are limited to the NFTS in the Kings River Special Management Area, which was established by Congress to provide for public outdoor recreation use and enjoyment and to protect natural and archaeological resources. Designated wild and scenic rivers on the SNF, including the Kings River (includes Middle Fork, South Fork and the main river) and the Merced River (includes the South Fork), and other special areas (e.g. botanical, geologic and historic) offer botanical, geologic and historic non-motorized experiences (to name a few). On the SNF there are approximately 592,000 acres where non-motorized recreation opportunities are available exclusive of motorized recreation. A majority of the identified non-motorized recreation is outside of the project boundaries.

Within the project boundary, visitors will find opportunities for hunting around meadows and riparian areas, fishing and water play at lakes, creeks, and streams and other non-motorized experiences. A vehicle may provide the access to the destination; however the actual non-motorized recreation begins when the visitor walks around the lake, brings a pole and goes fishing, or escapes from the heat in the valley.

3.3.3 Environmental Consequences

This section analyzes each of the alternatives for direct, indirect and cumulative effects of (1) prohibition of cross-country wheeled motor vehicle travel, (2) adding facilities, (3) changing NFTS facilities, and (4) a non-significant LRMP amendment.

Alternative 1 – No Action

Of all the alternatives, Alternative 1 will provide the most motorized opportunities with fewest limitations. No facilities will be added to the NFTS. Motorized cross-country travel will continue inside the area depicted in Figure 1-3 with a probable increase in the number of unauthorized motorized recreation routes. The SNF would continue to implement the 1998 Road Closure plan.

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Alternative 1 does not prohibit cross-country travel by wheeled motor vehicles and therefore has the greatest adverse effect to ROS consistency. There are 10.6 miles of unauthorized routes in the Primitive ROS class. Calculating acres per the 1986 ROS Book (USDA-FS 1986), 6,790 acres are impacted in the Primitive ROS class. In addition there are 10.3 miles of unauthorized routes located in Semi-Primitive Non-Motorized ROS class, which totals 6,598 acres impacted. There will be continued use in the area open to cross-country travel for motor vehicles with a probable proliferation of unauthorized motorized recreation routes. The probable proliferation may add to the adverse effect on ROS consistency.

There are 12 miles of unauthorized routes in inventoried roadless areas. The probable proliferation of unauthorized motorized routes in the area open to cross-country travel is expected to continue. This probable proliferation may add to the adverse effect on inventoried roadless areas.

Non-motorized recreation opportunity will continue for hunting, fishing, and other non-motorized activities. Comparing Figure 1-3 (displaying the area open to cross-country travel) to Figure 1-2 (displaying the Project Boundary) it is noticeable the project boundary is larger than the area open to cross-country travel. Therefore, the non-motorized activities will not be changed outside of the area open to cross-country travel. However, non-motorized activities within the area open to cross-country travel have the potential to be adversely impacted. Motor vehicles may impact riparian areas such as meadows, lakes and streams which in turn would impact the land and water based wildlife, which in turn would impact hunting, fishing and other non-motorized activities.

A majority of the challenging motorized recreation opportunity on the SNF will predominately occur on the 56 miles of motorized trails and 41 miles of primitive roads managed as motorized trails where a primitive motorized experience is offered. There are no changes to the NFTS proposed. There will be continued use in the area open to cross-country travel for motor vehicles with a probable proliferation of unauthorized motorized recreation routes. The proliferation may lead to a more homogenous motorized recreation opportunity over the next 20 years in the area identified in Figure 1-3, as the widening of the undesignated routes over time will provide no additional challenge or variety in degree of difficulty. Widening is assumed due to current management of motorized trails to continually prevent tread width increases with additional routes created to avoid difficult sections. The terrain in the area open to motorized cross-country travel and the existing unauthorized routes are generally flat with occasional moderate slopes. The consistency in terrain for current and additional unauthorized routes may not provide for a quality recreation experience. This may affect the quality of the experience for responsible motorized recreation visitors.

Motorized access to dispersed recreation will continue in areas depicted in Figure 1-3 open to cross-country travel. The area in the figure identified as where cross-country travel is prohibited would be limited to areas accessed from NFTS roads and trails. It is perceived Alternative 1 has the greatest amount of dispersed recreation sites due to the ability to travel cross-country to camp.

However, the average dispersed recreation sites are not along unauthorized routes but are approximately 100 feet from a system road, usually less than 75 feet.

The existing road system and closure plan would continue without change. There are 1,741 miles of roads open to all vehicles, including vehicles less than 50 inches wide.

The impacts of allowing cross-country motorized use include continued noise, dust and physical presence. Of the five alternatives, Alternative 1 has the greatest potential for an adverse effect of conflict with the neighboring private and Federal lands. Of the estimated 560 miles of unauthorized routes, there are 208 miles within 1/2 mile of private property.

Additions to the NFTS

No facilities will be added to the NFTS.

Changes to the NFTS

There will be no changes to the NFTS. The lack of changes will benefit the operators of red stickered vehicles with 1,402 miles roads open to All Vehicles.

Non-Significant LRMP Amendments

There will be no non-significant LRMP amendment issued under this alternative.

Cumulative Effects

Cross-country Motor Vehicle Travel

Opportunities to expand cross-country travel through currently brushed or heavily timbered areas will be increased with the approximately 4,000 acres per year of proposed fuel treatments within the project area. It is presumed these fuel reduction projects will open up additional opportunities to explore for cross-country travel. Approximately 2,500 acres of timber harvest is expected annually with a projection in 10 years of 5,000 acres annually. The proposed timber harvesting will open up additional opportunities to explore for cross-country travel. In addition, fuel reduction and timber harvesting may open up additional access to dispersed recreation opportunities.

Adverse cumulative effects to ROS may occur over the next 10 to 20 years with the construction of temporary roads and landings for accessing timber. However, according to the prescription, all temporary roads would be closed at the resolution of the timber projects. If the temporary roads are decommissioned, the long-term effect is minimal.

The unlimited travel on this section of the SNF will continue to be an adverse impact on the land, and therefore the cumulative effects have been fully described in the above sections.

Additions to the NFTS

No facilities will be added. However, unauthorized routes would proliferate with no prohibition of cross-country travel.

Changes to the NFTS

There are no changes to the NFTS.

Non-Significant LRMP Amendments

There will be no non-significant amendment issued under this alternative.

Alternative 2 – Proposed Action

In summary, 44 miles of routes are proposed for addition to the NFTS. Cross-country travel is prohibited. Seasons and types of use for roads and motorized trails are established. A Motor Vehicle Map (MVUM) of the designated system will be printed.

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

ROS classes are compatible with the intent of the LRMP for Roaded Natural and Primitive. There is a direct beneficial effect for the Primitive ROS class as 10.6 miles (6,790 acres) of unauthorized routes would no longer allow motor vehicle use. There is a beneficial effect in the Semi-Primitive Non-Motorized ROS class as 9.5 miles (6,086 acres) of unauthorized routes would no longer allow motor vehicle use. Alternative 2 would reduce acres in the Semi-Primitive Non-Motorized ROS class and increase Semi-Primitive Motorized ROS by 512 acres.

Prohibiting motor vehicle use on 12 miles of unauthorized routes in the inventoried roadless areas would be a beneficial affect.

There is a beneficial effect for non-motorized recreation users when compared to Alternative 1. Cross-country travel would be prohibited resulting in less wheeled motor vehicle activity. Specific motorized trails have been identified to reduce potential user conflict with non-motorized activities (in locations where non-motorized recreation is the predominant use and motorized recreation is neither expected nor desired) but still provide sufficient motorized access to recreation opportunities. Utilizing the analysis of acres ½ mile from an area where motorized use is proposed and including designated roads, trails and areas in the NFTS, there would be a 70,988 net gain in acreage available for quiet recreation and non-motorized activities.

There is an adverse effect for motorized recreation users when compared to Alternative 1. Alternative 2 provides wheeled motorized routes (44 miles) available for a variety of OHV opportunities. There is a net loss of approximately 605,000 acres available for wheeled motor vehicle activities due to the prohibition of cross-country travel. Motorized recreation opportunities would be focused on a designated system. Although there is an addition of 39 miles of trails in this alternative, there would be an adverse impact to the motorized recreation experience due to: (1) the reduction will compresses the existing and future use into a limited, designated system and (2) the prohibition of travel on 512 remaining miles of unauthorized routes. However, there would be 1,461 miles of roads seasonally open to all vehicles.

Motorized access to dispersed recreation would be decreased by over 1,000 parking and riding areas when compared to Alternative 1, due to the prohibition of use of existing unauthorized routes. However dispersed camping accessed from NFTS roads, trails and facilities, and the managed areas would continue.

The prohibition of cross-country motorized travel on the SNF would have beneficial effects on neighboring private and public lands. Reducing unauthorized routes within ½ miles of private property and federal lands from 208 miles to 19 miles would reduce vehicle related noise and dust. One adverse effect is direct access for motorized recreation from adjacent private property would no longer be available (i.e. unauthorized routes from private property directly onto NFS lands would be prohibited).

Additions to the NFTS

Addition of the proposed routes and area would be compatible with Roded Natural and Primitive ROS classes as intended in the LMRP. Predominant use would be in Roded Natural ROS class. There would be 0.8 miles of proposed additions located in Semi-Primitive Non-Motorized ROS class.

There are no facilities being added in established non-motorized areas.

Alternative 2 would provide designated trails for motorized recreation contributing to the variety of the riding experience (Motorcycle 6 percent, ATV and Quads 55 percent and four-wheel drive 39 percent). This alternative has the greatest range of difficulty (58 percent easy, 36 percent moderate and 6 percent difficult). In some areas the motorized recreation experience is enhanced due to extended riding time with access to loops and a larger network of roads and trails. Prohibiting cross-country travel to and only designating 39 miles of trails would be an adverse effect because motorized recreation opportunities are reduced and the existing and future use would be compressed into a limited, designated system. Though only 44 miles of roads and trails would be added to NFTS, the full network would include 57 miles of motorized trails, 41 miles of primitive roads managed as motorized trails and 1,461 miles of roads open to non-highway legal vehicles.

Alternative 2 was designed for recreational motorized experience with less emphasis on access to dispersed recreation. Access to dispersed recreation would continue to hundreds of NFTS facilities, managed sites, and the addition of one larger area (6 acres) authorized for parking.

Of the 44 miles of unauthorized routes proposed for designation in this alternative, 19 miles are located within ½ mile of neighboring private and federal lands. Motor vehicle use of these miles would have potential adverse noise effects, however slight, to the private property owner. This alternative would have the highest percentage (43 percent) of proposed new NFTS facilities (roads, trails and areas) within ½ mile of private property. However, the reduction of 189 miles of unauthorized routes within ½ mile of neighboring private and federal lands is a beneficial effect.

Changes to the NFTS

Changes to the NFTS are consistent with the current ROS classification.

There are no changes to the NFTS that would impact established non-motorized areas.

Motorized recreation users would benefit by changes in allowed vehicle types and an increase in motorized trails including: 12 additional miles would be changed from highway-legal only to open for travel by non-highway legal vehicles; 11 miles of closed road would be open to highway-legal only; 7 miles of roads would be converted to motorized trails; 59 miles of closed roads would be opened for travel by non-highway legal vehicles; and 1,461 miles of road remain would be open for travel by non-highway legal vehicles. This provides visitors with more connectivity between motorized trails resulting in longer loop opportunities. Calculating the changes to the motorized trail system (including 44 miles of road managed as motorized trails) results in 144 miles of motorized trail opportunities.

Changes in the season of use would have the potential to improve tread conditions. Stabilizing the tread through the use of erosion control devices and wet-weather closures provides for a beneficial effect for maintenance keeping the opportunities open for a recreation experience. The total miles of seasonally-open roads changed by 898 miles for various reasons, with resource protection the predominant reason. There are 1,054 miles open year-round and 909 miles open seasonally. Refer to Appendix A for more information regarding specific reasons for seasons of

use. The season of use on the majority of existing motorized trails would not. The season of use on the Spanish Trail on the most southern portion of the SNF would change from opening June 15 to opening 45 days later on August 1. The delay in opening this trail may not impact the majority of users, however there will be a few visitors adversely impacted. Spanish Trail is still open through the end of hunting season accommodating most deer hunting visitors. In addition, seasonal changes may adversely impact operators of off-highway vehicles with red stickers. Red sticker vehicles are able to operate on the Sierra National Forest between October 1 and May 31 on motorized trails and roads open to all vehicles. A majority of the roads and trails are open for use from mid to late May to either October 30 or November 30.

Access to dispersed recreation for many of the sites would have a season of use to protect natural and cultural resources. The season of use for the facilities, managed sites and the one 6-acre area would conform to the access roads' designated season of use. Changes in dispersed recreation sites season of use would include 23 percent of dispersed recreation sites would change from open year-round to a specific season of use. Of the remaining 6 percent of the areas, one site has no change to the open date, and will have a greater season of use, two sites open earlier in the year, and five sites open 10 days to a few months later in the year and remain open later in the year. These changes in seasons are expected to be minimally adverse to neutral with 77 percent of the sites having no change to the season of use.

Neighboring private and Federal lands may experience a beneficial effect from changes to the NFTS. Vehicle use would be reduced in certain areas where private lands are located. Specifically, the season of use for motorized recreation opportunities near private land in the Westfall Analysis Unit would decrease noise during the wet rainy season.

Non-Significant LRMP Amendments

Current LRMP direction is to "Maintain acreages in each ROS class to meet objectives shown on ROS element map (USDA-FS 1991, p. 4-13)." Without an amendment to S&G #2, Alternative 2 would not be consistent with this direction because of the proposed additions to the NFTS within Semi-Primitive Non-Motorized ROS Class. The proposed amendment would change the ROS class for the area immediately surrounding the additional motorized to Semi-Primitive Motorized ROS class to recognize existing motorized access and allow the addition of routes to the NFTS to provide needed semi-primitive motorized opportunities.

The effects of the proposed amendment, as shown in Table 3- 8, removes 512 acres from Semi-Primitive Non-Motorized to Semi-Primitive Motorized ROS Classes to allow the proposed 0.8 miles of NFTS trails to be designated for motor vehicle use. The remaining acreage would retain the semi-primitive non-motorized nature. There are no impacts to Congressionally-designated wilderness, wild and scenic rivers or any other designation.

The overall percentage of change of acres of Semi-Primitive Non-Motorized would have a neutral effect. Eight (8) percent of the SNF would remain designated as Semi-Primitive Non-Motorized.

Cumulative Effects

Cross-country Motor Vehicle Travel

ROS has the potential to be impacted by future temporary roads for fuel reduction and timber harvesting as well as log landings. However, current direction is to decommission temporary roads when the timber sale is completed. Therefore there are no contributions to adverse cumulative effects for ROS.

There are increased opportunities for non-motorized recreation away from the NFTS. There are no contributions to adverse cumulative effects for non-motorized recreation.

There is a diversity of motorized opportunities between the 1,461 miles of roads open to all vehicles, addition to the NFTS, and the existing system of primitive roads managed as motorized trails. There is a net loss in acreage available for motorized use. Therefore, there are no contributions to adverse cumulative effects for motorized recreation.

Dispersed recreational opportunities would continue to be available. However, there is a loss of access to over 1,000 dispersed parking areas greater than 30 feet from the road or accessed off an unauthorized route not brought forward for designation in this Alternative. Timber sales and fuel reduction may open logging decks that have the potential for additional parking for access to dispersed recreation. It is unknown what this contribution would be; as a result there are no contributions to adverse cumulative effects for access to dispersed recreation.

There is a beneficial effect for adjacent land owners and public lands and there are no adverse cumulative effects for these entities.

Additions to the NFTS

The addition of 44 miles of roads and motorized trails does not create any adverse cumulative effects for ROS, inventoried roadless areas, access to non-motorized activities, motorized recreation, access to dispersed recreation, or impacts to adjacent public and private lands.

Changes to the NFTS

The changes to the NFTS (roads and motorized trails) does not create any adverse cumulative effects for ROS, access to non-motorized activities, motorized recreation, access to dispersed recreation or impacts to adjacent public and private lands.

Non-Significant LRMP Amendments

A non-significant LRMP amendment would be implemented allowing for 0.8 miles of motorized trail opportunity to be used by the visiting public. This does not change the overall 8 percent of the ROS acreage in the Semi-Primitive Non-Motorized classification.

Alternative 3

Of all the alternatives, Alternative 3 would provide the least motorized recreation opportunity in terms of diversity and miles of routes available for motor vehicle use. The current baseline NFTS would remain in place and no additional routes would be added to the system. Cross-country travel would be prohibited. The SNF would continue to implement the 1998 Road Closure plan. A Motor Vehicle Use Map (MVUM) of the designated system would be printed.

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

ROS classes would be compatible with the LRMP because the 10.6 miles of unauthorized routes located in the Primitive class and 10.3 miles of unauthorized routes in Semi-Primitive Non-Motorized would be closed to motorized travel.

Prohibiting motor vehicle use on 12 miles of unauthorized routes would be a beneficial affect on the inventoried roadless areas.

Compared to all other alternatives, there would be the greatest increase in acreage available for non-motorized recreation activities without the potential for use conflicts with motor vehicles. Utilizing the analysis of acres ½ mile from an area where motorized use is proposed and including designated roads, trails and areas in the NFTS, there would be a net gain in acreage (71,063 acres) for quiet recreation activities in both the long and short term.

There would be an adverse affect on motorized recreation in Alternative 3. Cross-country travel would be prohibited, eliminating use on approximately 605,000 acres, although 1,650 miles of NFTS roads and trails would remain available to all vehicles. The quality of the recreation opportunity would be most affected. Much of the NFTS does not provide a quality recreation opportunity especially for those using non-highway legal motor vehicles. Use would be mostly limited to existing mixed use (ML 2) roads, which do not necessarily provide continuity or loops. In addition, challenging opportunities would be limited to the 57 miles of motorized trails and 41 miles of primitive roads managed as motorized trails. This is the least desirable alternative for motorized recreation.

There would be an adverse effect to motor vehicle access for dispersed recreation. Over 1,000 dispersed recreation sites would no longer be accessible by motor vehicle (though non-motorized access would remain available). There is a loss of access through the loss of unauthorized routes or the site being greater than 30 feet from NFTS. NFTS parking and managed areas would still be available.

The beneficial effect of prohibiting cross-country motorized use would be the reduction of noise, dust and physical presence. There would be a reduction of conflict with the neighboring private and Federal lands. The 208 miles within ½ mile of private property and Federal lands would no longer be in use. One adverse effect would be direct access for motorized recreation from adjacent private property would no longer be allowed (i.e. unauthorized routes from private property directly onto NFS lands would be prohibited).

Additions to the NFTS

No facilities would be added, ROS would be compatible with the LRMP, and there would be no additions to NFTS roads, motorized trails or areas.

Changes to the NFTS

There would be no changes in vehicle class or season of use for the NFTS. The SNF would continue to implement the 1998 Road Closure plan. The lack of changes would benefit the operators of red stickered vehicles with 1,402 miles roads open to All Vehicles.

Non-Significant LRMP Amendments

There would be no non-significant amendment issued under this alternative.

Cumulative Effects

Cross-country Motor Vehicle Travel

Adverse cumulative effects to ROS may occur over the next 10 to 20 years with the construction of temporary roads and landings for accessing timber. However, according to the prescription, all temporary roads would be closed at the resolution of the timber projects. If the temporary roads are decommissioned, the long term effect is minimal.

There would be increased opportunities for non-motorized recreation away from the NFTS. There would be no contributions to adverse cumulative effects for non-motorized recreation.

Motorized recreation would be adversely impacted by this alternative because cross-country travel would be prohibited and no unauthorized routes would be added to the NFTS. This would result in a cumulative loss of motorized recreation opportunities. A review of Appendix E does not identify any additional adverse effects.

Dispersed recreational opportunities would continue to be available. However, there would be a loss of motor vehicle access to over 1,000 dispersed parking areas greater than 30 feet from the road or accessed off an unauthorized route. The loss of motorized access for parking near dispersed recreation activities would be an adverse impact for some forest visitors. Activities listed in Appendix E do not contribute to cumulative adverse effects.

A beneficial effect would occur for adjacent private property owners and other public land uses. There would be no unauthorized routes creating dust or noise near the neighboring private and public lands. Due to this beneficial effect, there are no cumulative adverse effects.

Additions to the NFTS

No facilities would be added; there would be no additions to the NFTS roads, motorized trails or areas. The restriction to travel on this section of the SNF would be a beneficial impact on the land, and therefore will not contribute to cumulative adverse effects.

Changes to the NFTS

There would be no changes in vehicle class or season of use for the NFTS. As with additions to the NFTS, the restriction to travel (with the seasonal changes outlined in the 1998 Road Closure Plan) will have a beneficial impact on the land, and therefore will not contribute to cumulative adverse effects.

Non-Significant LRMP Amendments

There will be no non-significant amendment issued under this alternative.

Alternative 4

In summary, 51 miles of roads and motorized trails are proposed for addition to the NFTS. Cross-country travel would be prohibited. Seasons and types of use for roads and motorized trails would be established. A Motor Vehicle Use Map (MVUM) of the designated system would be printed.

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

ROS would be compatible with the intent of the LMRP for Roded Natural and Primitive. There would be a direct beneficial effect for the Primitive ROS class as 10.6 miles (6,790 acres) of unauthorized routes would no longer allow motor vehicle use. There is a direct beneficial effect in the Semi-Primitive Non-Motorized ROS class as 8.7 miles (5,573 acres) of unauthorized routes would not allow motor vehicle use. Alternative 4 has a potential adverse effect to the Semi-Primitive Non-Motorized ROS class with a 1,074-acre reduction. These acres would be changed to Semi-Primitive Motorized ROS.

There would be more of a beneficial effect to non-motorized recreation when compared to Alternative 1. Cross-country travel would be prohibited resulting in less wheeled motor vehicle activity. Motorized trails would be identified to reduce potential user conflict with non-motorized activities (locations where non-motorized recreation would be the predominant use and motorized recreation would neither be expected nor desired) but still provide sufficient motorized access for such activities. Utilizing the analysis of acres ½ mile from where motorized use is proposed and including designated roads, trails and areas in the NFTS, there would be a 70,677 net gain in acreage available for quiet recreation and non-motorized activities.

There would be more of an adverse affect to motorized recreation when compared to Alternative 1. Alternative 4 would provide wheeled motor vehicle routes (108 miles) available for a variety of OHV opportunities. There would be a net loss of approximately 605,000 acres available for wheeled motor vehicle activities due to the prohibition of cross-country travel. Motorized recreation opportunity would be focused on a designated system. Although there would be an addition of 42 miles of motorized trails, there would be an adverse effect due to 1) the reduction would compress the existing and future use into a limited, designated system and 2) the prohibition of motorized travel on 474 remaining miles of unauthorized routes would reduce motorized recreation opportunities. However, there would be 1,417 miles of roads open to all vehicles.

Motorized access to dispersed recreation would be decreased by over 1,000 parking and/or riding areas when compared to Alternative 1, due to the prohibition of use of unauthorized routes. However dispersed camping accessed from NFTS roads and facilities, and the managed system roads would continue.

Neighboring private and other Federal lands would benefit from the prohibition of cross-country motorized travel on the SNF. The prohibition would reduce noise, dust and vehicle use within ½ mile of private property and other public lands from 208 miles to 12 miles. One adverse effect would be the loss of direct access for motorized recreation from adjacent private property (i.e. unauthorized routes from private property directly onto NFS lands would be prohibited).

Additions to the NFTS

Addition of the proposed routes and area would be compatible with Roded Natural and Primitive ROS classes as intended in the LMRP. Predominant use would be in Roded Natural ROS class. There would be 1.6 miles of proposed additions located in Semi-Primitive Non-Motorized ROS class. There would be no additional facilities in established non-motorized areas or inventoried roadless areas.

Alternative 4 would provide designated trails contributing to the variety of the riding experience (7 percent motorcycle, 45 percent ATV and quads, and 48 percent four wheel drive). This alternative would provide the smallest range of terrain challenge (60 percent easy, 34 percent moderate and 7 percent difficult). In some areas the riding experience would be enhanced due to extended riding time with access to loops and a larger network of roads and trails. Although 51 miles of motorized trails would be added to the NFST, compressing existing and future use into a limited, designated system would be an adverse affect on the motorized recreation experience. However, there would be 57 miles of motorized trails, 41 miles of primitive roads managed as motorized trails and 1,417 miles of roads open to non-highway legal vehicles.

Access to dispersed recreation would continue to hundreds of NFTS facilities, managed sites, and the addition of 11 areas (37 acres). Five of the areas (34 acres) would provide a motorized recreation experience. Open to all trail vehicles, these areas would provide an unstructured environment. Six of the areas (3 acres) would be parking areas for highway-legal vehicles only.

Parking areas tend to be used to access dispersed recreation while areas open to all trail vehicles provide a recreation experience.

Of the 51 miles of unauthorized routes proposed for designation in this alternative, 12 miles would be located within ½ mile of neighboring private property and other public lands. This would have the potential adverse effect of providing noise, however slight, to the private property owner. This alternative would have the lowest percentage (24 percent) of proposed new NFTS facilities (roads/trails/areas) within ½ mile of private property. However, the reduction of 196 miles of unauthorized routes within ½ mile of neighboring private and federal lands would be a beneficial effect.

Changes to the NFTS

Changes to the NFTS would be consistent with the current ROS classification.

There would be no changes to the NFTS that would impact established non-motorized areas.

Motorized recreation would be benefit by changes in allowed vehicle types: 25 additional miles would be changed from HLO to available for travel by non-highway legal vehicles; 60 miles of closed roads would be opened for travel by non-highway legal vehicles; and a total of 1,417 miles of road would remain open for travel by non-highway legal vehicles. This would provide visitors with more connectivity between motorized trails resulting in longer loop opportunities. Nine miles of roads would be converted to motorized trails resulting in a total of 108 miles of motorized trails.

Changes in the season of use would have the potential to improve tread conditions. Miles of seasonally-open roads would change by 1,742 miles for various reasons, with resource protection the predominant reason. There would be 383 miles open year-round, 1,512 miles open seasonally, and 383 miles closed year-round. In addition, seasonal changes may adversely impact operators of off-highway vehicles with red stickers. Red sticker vehicles are able to operate on the Sierra National Forest between October 1 and May 31 on motorized trails and roads open to all vehicles. A majority of the roads and trails would be open for use from mid to late May and close either October 30 or November 30. See Appendix A for more information regarding specific reasons for seasonal open periods.

Motorized access to dispersed recreation for many of the sites would be seasonally open to protect natural and cultural resources. The seasonal open period for the facilities, managed sites including the additional 11 proposed sites will conform to the seasonal open period of the access road. There are few changes to the seasonal period. Thirty-seven (37) percent of sites to access dispersed recreation that were changed to have a season of use did not have any season identified, 13 percent of the sites will delay opening, usually 15 to 60 days delayed, 47 percent have no change from Alternative 1 and of the remaining 3 percent of the areas, four will have a longer season of use, and four will have shorter seasons of the use

Neighboring private and Federal lands may experience a beneficial effect from changes to the NFTS. Vehicle use would be reduced in certain areas where private lands are located. Specifically, the motor vehicle season of use near private land in the Westfall Analysis Unit would prevent noise during the wet rainy season.

Non-Significant LRMP Amendments

Current LRMP direction is to “Maintain acreages in each ROS class to meet objectives shown on ROS element map (USDA-FS 1991 p. 4-13).” Alternative 4 would not be consistent with this direction because of proposed additions to the NFTS within Semi-Primitive Non-Motorized ROS Class as mapped during LRMP development. The proposed amendment would change the ROS

class for the area immediately surrounding the route added to the NFTS in Semi-Primitive Non-Motorized ROS class to Semi-Primitive Motorized ROS class. This would recognize existing motorized access and allow the addition of roads and motorized trails to the NFTS to provided needed semi-primitive motorized opportunities.

The proposed amendment in Alternative 4 as shown in Table 3-8, would move 1,074 acres from Semi-Primitive Non-Motorized to Semi-Primitive Motorized ROS Classes. This would allow the proposed designation of 1.6 miles of NFTS motorized trails to be consistent with the LMRP. The remaining acreage would retain the semi-primitive non-motorized nature. There would be no impacts to Congressionally-designated wilderness, wild and scenic rivers or any other designation.

Cumulative Effects

Cross-country Motor Vehicle Travel

ROS has the potential to be impacted by future temporary roads for fuel reduction and timber harvesting as well as log landings. However, current direction is to decommission temporary roads when the timber sale is completed. Therefore there would be no contributions to adverse cumulative effects for ROS.

There would be increased opportunities for non-motorized recreation away from the NFTS. There would be no contributions to adverse cumulative effects for non-motorized recreation.

There would be a diversity of motorized opportunities between the 1,417 miles of roads open to all vehicles, addition to the NFTS, and the existing system of primitive roads managed as motorized trails. There would be a net loss in acreage available for motorized use. Therefore, there would no contributions to adverse cumulative effects for motorized recreation.

Motor vehicle access for dispersed recreational opportunities would continue to be available. However, there would be a loss of motor vehicle access to over 1,000 dispersed parking areas greater than 30 feet from the road or accessed off an unauthorized route not brought forward in this Alternative for designation. Timber sales and fuel reduction may open logging decks that have the potential for additional parking areas for access to dispersed recreation. It is unknown what the contribution would be; as a result, there would be no contributions to adverse cumulative effects for access to dispersed recreation.

There would be a beneficial effect for adjacent land owners and other public lands and there would be no adverse cumulative effects for these entities.

Additions to the NFTS

ROS would be slightly impacted with the addition of motorized transportation facilities. There would be 1.64 miles of proposed motorized trails located in the Semi-Primitive Non-Motorized ROS Class. The impact results in a 0.001% loss of Semi-Primitive Non-Motorized acres.

Facilities being added have a beneficial effect for non-motorized recreation experiences with an increase of acreage where vehicles are not allowed to travel. The net loss of 604,938 acres of cross-country travel increases the available acreage for quiet recreation.

Although this alternative would add 51 miles of NFTS designated for motor vehicle use, there is a perception it adversely compresses OHV opportunities. However, the proposed additional access to roads by non-highway legal vehicles is beneficial. Seasons of use identified for the designated system would benefit the natural and cultural resources. A variety of motorized opportunities would be available to accommodate a variety of vehicle classes and difficulty levels distributed

across the SNF. Although a reduction in miles of unauthorized routes would occur, and seasons of use would be designated on some trails, this system would be manageable and sustainable.

Dispersed recreational opportunities would continue. Motorized use conflicts with adjacent ownership would be minimized.

Changes to the NFTS

The changes in seasons and vehicle types for roads and trails would not create any adverse cumulative effects for ROS, access to non-motorized activities, motorized recreation, access to dispersed recreation, or impacts to adjacent public and private lands.

Non-Significant LRMP Amendments

A non-significant LRMP amendment would be implemented allowing for 1.6 miles of motorized trail opportunity to be used by the visiting public. The acreage change is statistically insignificant and it does not change the overall 8 percent of the Semi-Primitive Non-Motorized ROS acreage available across the forest.

Alternative 5

In summary, 85 miles of roads and trails are proposed for addition to the NFTS. Cross-country travel would be prohibited. Seasons and types of use for roads and motorized trails would be established. Of the five alternatives, Alternative 5 would provide the maximum additions for motorized opportunities. This alternative responds to the impacts to motorized access issue by providing additional motorized trails, providing additional combined and mixed use roads and providing more motor vehicle access to dispersed recreation activities than alternatives 2, 3 and 4. A Motor Vehicle Map (MVUM) of the designated system would be printed.

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

ROS would be compatible with the intent of the LMRP for Roded Natural and Primitive. There would be a direct beneficial affect on the Primitive ROS class as 10.6 miles (6,790 acres) of unauthorized routes would no longer allow motor vehicle use. There would be a direct beneficial affect on the Semi-Primitive Non-Motorized ROS class as 8.7 miles (5,573 acres) of unauthorized routes would not allow motor vehicle use. Alternative 5 has a potential adverse effect to the Semi-Primitive Non-Motorized ROS class due to moving 1,074 acres to Semi-Primitive Motorized ROS.

Prohibiting motor vehicle use on 12 miles of unauthorized routes in the inventoried roadless areas would be a beneficial affect.

There would be more of a beneficial affect to non-motorized recreation when compared to Alternative 1. Cross-country travel would be prohibited resulting in less wheeled motor vehicle activity. Motorized trails would be identified to reduce potential user conflict with non-motorized activities (locations where non-motorized recreation would be the predominant use and motorized recreation would be neither expected nor desired) but still provide sufficient motorized access for such activities. Utilizing the analysis of acres $\frac{1}{2}$ mile from an area where motorized use is proposed and including designated roads, trails and areas in the NFTS, there would be a 70,395 net gain in acreage available for quiet recreation and non-motorized activities.

There would be more of an adverse affect on motorized recreation when compared to Alternative 1. Alternative 5 would provide wheeled motor vehicle routes (140 miles) available for a variety of OHV opportunities. There would be a net loss of approximately 605,000 acres available for wheeled motor vehicle activities due to the prohibition of cross-country travel. Motorized recreation opportunity would be focused on a designated system. Although there would be an addition of 85 miles of motorized trails, there would be an adverse impact due to (1) the reduction would compress the existing and future use into a limited, designated system and (2) the prohibition of motorized travel on 453 remaining miles of unauthorized routes would reduce motorized recreation opportunities. However, there would be 1,647 miles of roads seasonally open to all vehicles.

Motorized access to dispersed recreation would be decreased by over 1,000 parking and/or riding areas compared to Alternative 1, due to the prohibition of motor vehicle use on unauthorized routes. However, dispersed camping accessed from NFTS roads, trails and facilities, and the managed areas will continue.

Neighboring private and public lands would benefit from the prohibition of cross-country motorized travel on the SNF. The prohibition would reduce noise, dust and vehicle use within ½ mile of private property and other public lands from 208 miles of unauthorized routes to 26 miles. One adverse effect would be the loss of direct access for motorized recreation from adjacent private property (i.e. routes from private property directly onto NFS lands would be prohibited).

Additions to the NFTS

Addition of the proposed roads, motorized trails and area would be compatible with Roded Natural and Primitive ROS classes as intended in the LMRP. Predominate use would be in the Roded Natural ROS Class. There would be 0.8 miles of proposed additions located in Semi-Primitive Non-Motorized. There would be no facilities being added in established non-motorized areas.

Alternative 5 would provide designated trails contributing to the variety of the riding experience (9 percent motorcycles, 46 percent ATV and quads and 45 percent four-wheel drive). This alternative has a range of difficulty (66 percent easy, 28 percent moderate and 5 percent difficult). In some areas the motorized recreation experience would be enhanced due to extended riding time with access to loops and a larger network of roads and trails. There would be an adverse effect by prohibiting cross-country travel to only 70 miles of trails and there is concern that this reduction of opportunity would compresses the existing and future use into a limited, designated system. Though only 85 miles of roads and trails would be added to NFTS, there are 57 miles of motorized trails and 40 miles of primitive roads managed as motorized trails and 1,647 miles of roads open to non-highway legal vehicles.

Motor vehicle access to dispersed recreation would continue to hundreds of NFTS facilities, managed sites, and through the addition of 20 areas (105 acres). Ten of the areas (98 acres) would be available for a motorized recreation experience. Open to all trail vehicles, these areas would provide an unstructured environment. The remaining ten areas (7 acres) are parking locations for highway-legal vehicles only. Parking tends to be used to access dispersed recreation while areas open to all trail vehicles provide a recreation experience.

Of the 85 miles of unauthorized routes proposed for designation in this alternative, 26 miles would be located within ½ mile of neighboring private property and public lands. Motor vehicle use of these miles would have the potential adverse effect of providing noise, however slight, to the private property owner. This alternative would have 31 percent of proposed new NFTS facilities (roads/trails/areas) within ½ mile of private property. However, there would be a

beneficial effect with the reduction of 182 miles of unauthorized routes within ½ mile of neighboring private and federal lands.

Changes to the NFTS

Changes to the NFTS would be consistent with the current ROS classification.

There would be no changes to the NFTS that would impact established non-motorized areas or inventoried roadless areas.

Motorized recreation users would benefit from changes in allowed vehicle types: 125 additional miles would be changed from highway-legal only to available for travel by non-highway legal vehicles; 60 miles of closed roads would be opened for travel by non-highway legal vehicles; and 1,647 miles of road would remain seasonally open for travel by non-highway legal vehicles. In addition, 53 miles of NFTS roads designed for use by highway-legal only vehicles would allow non-highway legal vehicles (mixed use). These changes, along with 12 miles of roads converted to trails, would provide a beneficial direct effect by providing visitors recreating with non-highway legal vehicles more connectivity between the cumulative 139 miles of motorized trails and 1,647 miles of roads, resulting in longer loop opportunities. This would provide visitors with more connectivity between motorized trails resulting in longer loop opportunities. Changes to the seasons of use would improve tread conditions. Stabilizing the tread through the use of erosion control devices and wet-weather closures would provide a beneficial effect for maintenance and the recreation experience. Seasonally open roads would change 1,569 miles for various reasons, with resource protection the predominant reason. There would be 460 miles open year-round and 1,532 miles open seasonally. In addition, seasonal changes may adversely impact operators of off-highway vehicles with red stickers. Red sticker vehicles are able to operate on the Sierra National Forest between October 1 and May 31 on motorized trails and roads open to all vehicles. A majority of the roads and trails would be open for use from mid to late May and close either October 30 or November 30. See Appendix A for more information regarding specific reasons for seasonal open periods.

Motor vehicle access to dispersed recreation for many of the sites would be seasonally open to protect natural and cultural resources. The seasons of use for the transportation facilities, managed sites and the 20 proposed sites would conform to the season of use of the access road. There would be few changes to the seasonal period. Eighty-two (82) percent would not change from Alternative 1, 14 percent would delay the opening of the area, usually 15 to 30 days, the remaining 4 percent would include four areas with longer seasons, and four areas with shorter seasons.

Neighboring private and Federal lands would benefit from changes to the NFTS. Motor vehicle use would be reduced in certain areas where private lands are located. Specifically, the season of use for motorized recreation opportunities near private land in the Westfall Analysis Unit would result in less noise during the wet rainy season.

Non-Significant LRMP Amendments

The Recreation Opportunity Spectrum assesses existing recreation characteristics on the thorough application of a set of criteria: remoteness, size, evidence of humans, user density, and managerial regimentation and notice ability. The criteria are used to assign one of seven ROS classes to geographic areas on the forest: Primitive, semi-primitive non-motorized, roaded natural, roaded modified, rural and urban. The current ROS classes for the SNF were mapped as part of the development of the LRMP in the mid 1980s. The current distribution of ROS classes is shown on the LRMP map entitled “Recreation Opportunity Class Objective Map.” The ROS boundaries shown on this map were digitized and used in the following analysis.

Current LRMP direction is to “Maintain acreages in each ROS class to meet objectives shown on ROS element map (USDA-FS 1991, p. 4-13).” Alternative 5 would not be consistent with this direction because of proposed additions to the NFTS within Semi-Primitive Non-Motorized ROS Class as mapped during LRMP development. The proposed amendment would change the ROS class for the area immediately surrounding the road or motorized trail added to the NFTS in Semi-Primitive Non-Motorized ROS class to recognize existing motorized access and allow the addition of routes to the NFTS to provide needed semi-primitive motorized opportunities.

The proposed amendment in Alternative 5 as shown in Table 3- 8 would move 1,074 acres from Semi-Primitive Non-Motorized to Semi-Primitive Motorized ROS Classes to allow the proposed 1.6 miles of NFTS motorized trails to be designated. The remaining acreage would retain the semi-primitive non-motorized nature. There would be no impacts to Congressionally-designated wilderness, wild and scenic rivers or any other designation.

The overall percentage change of acres of Semi-Primitive Non-Motorized will have a neutral effect. Nine (9) percent of the SNF is designed as Semi-Primitive Non-Motorized.

Cumulative Effects

Cross-country Motor Vehicle Travel

ROS has the potential to be impacted by future temporary roads for fuel reduction and timber harvesting as well as the development of log landings. However, current direction is to decommission temporary roads when the timber sale is completed. Therefore, there would be no contributions to adverse cumulative effects for ROS. There would be increased opportunities for non-motorized recreation away from the NFTS. There would be no contributions to adverse cumulative effects for non-motorized recreation.

There would be a diversity of motorized opportunities between the 1,647 miles of roads open to all vehicles, additions to the NFTS, and the existing system of primitive roads managed as motorized trails. There would be a net loss in acreage available for motorized use.

Motor vehicle access to dispersed recreational opportunities would continue to be available. However, there would be a loss of access to over 1,000 dispersed parking areas greater than 30 feet from the road or accessed off an unauthorized route not designated in this alternative. Timber sales and fuel reduction may open logging decks that could have the potential for additional parking for access to dispersed recreation. It is unknown what the contribution would be; as a result there would be no contributions to adverse cumulative effects for access to dispersed recreation.

There would be a beneficial effect for adjacent land owners and public lands and there would be no adverse cumulative effects for these entities.

Additions to the NFTS

The addition of 85 miles of roads and trails and 20 areas would not create any adverse cumulative effects for ROS, inventoried roadless areas, access to non-motorized activities, motorized recreation, access to dispersed recreation, or impacts to adjacent public and private lands.

Changes to the NFTS

The changes to the NFTS (roads and motorized trails) would not create any adverse cumulative effects for ROS, access to non-motorized activities, motorized recreation, access to dispersed recreation or impacts to adjacent public and private lands.

Non-Significant LRMP Amendments

A non-significant LRMP amendment would be implemented allowing for 1.6 miles of motorized trail opportunity to be used by the visiting public. This would not change the overall 8 percent of the ROS acreage in the Semi-Primitive Non-Motorized classification on the SNF.

Compliance with the LRMP and Other Direction

Alternatives 2, 3, 4 and 5 are consistent with:

Sierra National Forest Land and Resource Management Plan and best meet LRMP objectives for this area.

Travel Management Rule (36 CFR 212, 251, 261 and 295): The SNF Travel Management EIS is designed to implement the requirements of the November 5, 2005 Rule for Travel Management.

3.4 Society, Culture and Economy

3.4.1 Introduction

This chapter presents information on the social, cultural, and economic environments of communities that may be affected by the SNF Travel Management decision. Through examination of demographic and economic data, the following discussion provides an analysis of potential socioeconomic effects resulting from the actions proposed in this FEIS.

This section is organized as follows:

- Economic effects analysis
- American Indian rights and interests
- Civil Rights and Environmental Justice

3.4.2 Effects Analysis Methodology

Economic effects can be categorized as direct, indirect and induced. Direct effects are changes directly associated with spending by a recreation visitor. Indirect and induced effects are the multiplier effects resulting from subsequent rounds of spending in the local economy.

Input-output analysis was used to estimate the direct, indirect and induced employment and labor income effects stemming from motorized and non-motorized use. Input-output analysis (Hewings 1985) is a means of examining relationships within an economy both between businesses as well as between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. The resulting mathematical representation allows one to examine the effect of a change in one or several economic activities on an entire economy. This examination is called impact analysis. Input-output analysis requires the identification of an economic impact area. The economic area that surrounds the SNF used for this jobs and income analysis was Mariposa, Madera and Fresno Counties. The aggregate of these three counties will be called the SNF Region for the remainder of the Society, Culture and Economy section of this FEIS.

While the individual economies of each county have unique qualities and characteristics, they do not exist in a vacuum. They are complex, dynamic, and interconnected. The decision to use county aggregates as the basis for the analysis was made by Forest Service economists who felt this method would more accurately reflect the economic impacts of a Travel Management decision region-wide. It should be noted that the economic analysis in the FEIS was also not narrowed to the county or local community level because Forest Service modeling and data is less accurate at scales smaller than forestwide (the SNF lies within all three counties). The Forest Service National Visitor Use Monitoring (NVUM) data is the best available science for economic analysis of National Forest effects to local economies and its accuracy is compromised of more narrow data sets. General census data is available at smaller scales (zip code), but sample sizes are much decreased, and the link with Forest Service modeling and data would become too weak resulting in compounding error levels at that scale.

The IMPLAN Pro input-output modeling system and 2006 IMPLAN data (the most recent data available) were used to develop the input-output model for this analysis (IMPLAN® Professional 2004). IMPLAN (IMpact analysis for PLANning) translates changes in final demand for goods and services into resulting changes in economic effects, such as labor income and employment in the affected area. For the SNF Region, employment and labor income estimates attributable to all current recreation use and other activities were generated.

The expenditure and use information collected by the Forest Service NVUM survey are crucial elements in the economic analysis. The NVUM survey collects use and expenditure information for various activity types. The expenditure information is collected by twelve activity groups within four trip segments (non-local overnight trips, non-local day trips, local day trips and local overnight trips) (Stynes and White 2005, 2008). The reported spending for each of the spending categories is allocated to the appropriate industry within the IMPLAN model (the allocation process, also referred to as “bridging,” was conducted by the USDA Forest Service, Planning Analysis Group in Fort Collins, CO). The bridged IMPLAN files were used to estimate economic effects (e.g., employment and labor income) related to changes in spending (i.e., changes in spending, technically referred to as changes in final demand, are caused by changes in use).

Estimated economic effects are displayed in terms of:

- Direct, indirect, and induced employment and labor income response coefficients by activity type (jobs and labor income per 1,000 visits); and
- Estimated employment and labor income by motorized and non-motorized activity types.

Spatial Boundary for Effects Analysis

The SNF lies within Fresno, Madera, and Mariposa counties. The special boundary for the society, culture, and economic effects includes these three counties (SNF Region).

For most of the SNF Region, people orient themselves toward the three counties’ urban areas for work. For recreation they orient towards urban parks and bikeways, Sierra and Sequoia National Forests, Yosemite and Sequoia/Kings Canyon National Parks, and the central California coast.

Data Sources

- U.S. Forest Service NVUM data
- U.S. Census Bureau
- California Department of Finance
- American Indian Laws and Regulations
- Public Comment

3.4.3 Affected Environment and Environmental Consequences

Population and Demographics

Historical Background

The 1.3 million-acre SNF lies on the western slope of the Sierra Nevada range. Originally, the land was home to Native American Indians. Here for thousands of years, the Miwok, Monos, Yokuts and other tribes lived in harmony with the land.

With the discovery of California gold in 1848, thousands of newcomers swarmed the foothill and mountains. Miners, lumbermen, stockmen and settlers flocked to the area, resulting in over grazing, indiscriminate logging and uncontrolled forest fires. The most powerful force that would shape the landscape of the forest was the development of hydroelectric generating facilities. Over

the next 80 years, 20 powerhouses and 11 reservoirs would be constructed producing electricity for two million homes annually.

The San Joaquin Valley was also becoming known as the Nation's breadbasket and stored water was needed to irrigate its rich farmland. Valley residents were also seeking relief from the sweltering summer heat and looked to mountains for a place to escape and to recreate. Thanks to the automobile, hikers, hunters, campers and anglers were coming to the mountains and forests in increasing numbers to use and enjoy their National Forest.

In the 1930s the Civilian Conservation Corps (CCC) provided labor to build roads, trails, campgrounds and to fight forest fires on the SNF. During the 10 years the CCC program was in existence, 16 bridges were constructed, 240 miles of roads and trails were built (including the John Muir Trail) 90 miles of fire breaks were added, 62 buildings and lookout towers were finished, 145 miles of telephone lines were strung, 70 campgrounds were improved, 85,000 trees were planted and thousands of hours were spent fighting forest fires.

World War II brought dramatic changes to the SNF. Almost overnight the SNF had to shift to supporting the war effort. Our public forests were looked upon to provide wood, beef and tungsten, which were badly needed to support the war. The demand for lumber during the war brought the first chainsaws to the forest in 1943. With the added demand for beef to feed the soldiers, the SNF increased cattle grazing to provide for the war effort.

World War II came to an end and the Nation now faced the task of making the transition from war to peace. Visitors once again recreated in the SNF; camping, fishing and enjoying the mountains. Four new reservoirs were under construction or just completed, including, Edison, Wishon, Courtight and Mammoth Pool Reservoirs. Across the SNF, sawmills were operating, providing lumber for the postwar housing boom. Thousands of surplus war Jeeps had been bought and the new owners were looking for places to use them. Many of them turned to the National Forests and wanted to use them at will, going wherever they wanted. The SNF reacted in 1958 by implementing an OHV plan to manage this use.

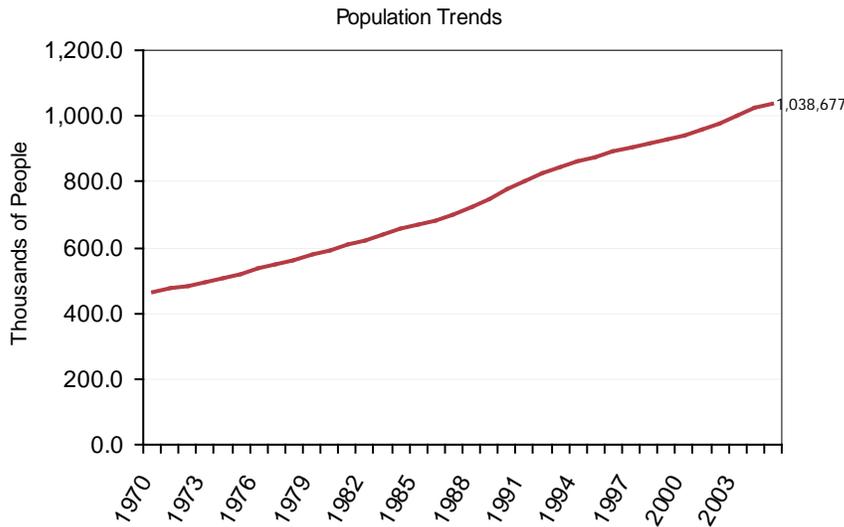
The SNF is known for some of the most beautiful and rugged backcountry in the Sierra Nevada. The passage of the 1964 Wilderness Act designated the Minarets and John Muir Wildernesses. The 1984 California Wilderness Act designated expanded acreage in the John Muir, Dinkey Lakes, Monarch and Ansel Adams Wildernesses.

During 1990s the Forest Service adopted a new management philosophy known as ecosystem management. Ecosystem management was not a radical departure from the past, but a more holistic approach to managing our public lands. The California spotted owl issue would also frame this decade and in 1992 new guidelines were released that resulted in a dramatic decline in timber harvests. In 1998, the Forest Service launched one of its most extensive planning efforts, the Sierra Nevada Framework. This effort reinforced the need to address all components of the ecosystem in a balanced and scientific manner.

Current Population and Growth Trends

The SNF Region contains an estimated one million people. From 1970 to 2005 population grew by 575,945 people, a 124 percent increase in population (Figure 3- 1). Total population in 2000 was 939,646 people, up 22 percent from 769,882 in 1990. Over the last 35 years population growth in SNF Region has outpaced that of the State and the Nation. The population of these counties is changing in terms of numbers of people, age and ethnic composition, incomes, occupations and leisure activities.

Figure 3- 1. Population Trend for Counties in the SNF Region (aggregate of all three counties)



The smallest proportion of the SNF Region’s population lives in Mariposa County (about two percent of the population). Madera County is about 16 percent, with Fresno County having the largest population with 81 percent of the population.

The population density of each county varies widely, with Mariposa having approximately 12 people per square mile (sq. mi.), Madera County 66 people per sq. mi. and Fresno County 147 people per sq. mi. (California Department of Finance, 2005).

California State agencies have projected population growth for the SNF Region’s counties. In the next decade, most counties are expected to grow at a faster rate than they did between 1989 and 1998. Population increases may affect how communities develop. The Forest Service will need to respond to increasing needs for potable water, recreation, natural resource extraction and community fire protection.

Ethnicity

The distribution of ethnic groups in the SNF Region differs only slightly from the State of California averages (Table 3- 18). The ethnic diversity of Madera and Fresno Counties is similar to that of the State of California. Mariposa County is less ethnically diverse with 86 percent of the population (in 2004) being in the ethnic class of “White, not Hispanic.” In Fresno and Madera counties, the population percentage of Hispanics is greater than that of the State. The population percentage of American Indians in the SNF Region is greater than that of the State.

Table 3- 18. Percent of SNF Region County Populations by Ethnicity, 2004

County	White, not Hispanic (percent)	Hispanic (percent)	Asian/ Pacific Islander (percent)	Black American (percent)	American Indian (percent)
Mariposa	86.2 %	7.1 %	0.8 %	0.6 %	3.1 %
Madera	46.7 %	45.9 %	1.3 %	3.0 %	1.4 %
Fresno	37.2 %	46.9 %	8.9 %	4.9 %	0.8 %
State Average	44.6 %	34.8 %	12.0 %	6.0 %	0.6 %

Age Distribution of the Population

In the SNF Region, the population has gotten older since 1990 (Table 3- 19). The median age in 2000 was 30.4 years, up from 29.7 years in 1990. The largest age category is 0 to 20 years old. The age group that has grown the fastest, as a share of total, is the 40 to 54 years category.

Table 3- 19. Percent of Population of SNF Region Counties by Age Group

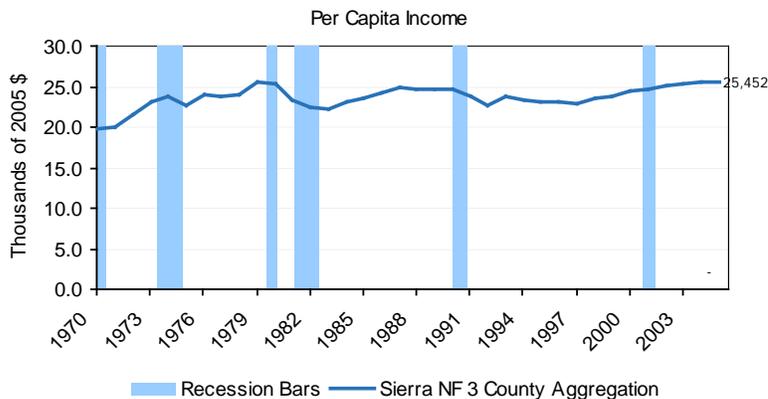
Population by Age							
	Under 20 years		40 - 54 (Baby Boom in 2000)		65 years and over		Median Age
	Number	Share	Number	Share	Number	Share	
Total Population							
2000	328,298	35 %	177,642	19 %	95,745	10 %	30.4
1990	263,278	34 %	119,342	16 %	82,553	11 %	29.7
10 Yr. Change	65,020	1 %	58,300	3 %	13,192	-1 %	0.7

Source: U.S. Census Bureau 1990 and 2000

Per Capita Income

Figure 3- 2 shows that per capita income for the three counties, adjusted for inflation, has risen from \$19,700 in 1970 to \$25,452 in 2005. In 2005, per capita income in SNF Region (\$25,452) was lower than the State (\$36,936) and the Nation (\$34,471).

Figure 3- 2. Per Capita Income



Employment and Income: Affected Environment

Table 3- 20 illustrates how the distribution of local employment by sector compares to the Nation. **Arts, entertainment and recreation** sector employs 1 percent of the workforce, **accommodations and food service** sector employs 6 percent of the workforce, and **retail trade** sector employs 11 percent of the workforce. These are the three sectors most likely to be affected by decisions made in this document.

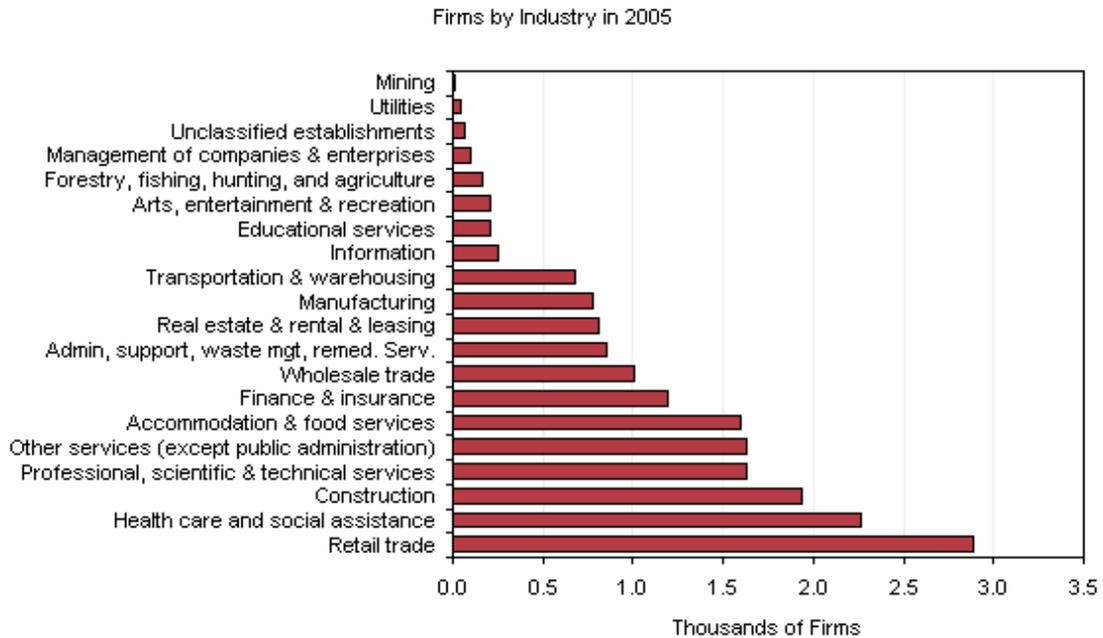
Table 3- 20. Employment Sectors

	Study Area	U.S.
Agriculture, forestry, fishing and hunting	9 %	1 %
Educational services	11 %	9 %
Public administration	7 %	5 %
Wholesale trade	5 %	4 %
Health care and social assistance	12 %	11 %
Admin, support and waste management services	4 %	3 %
Other services (except public administration)	5 %	5 %
Accommodation and food services	6 %	6 %
Real estate and rental and leasing	2 %	2 %
Management of companies and enterprises	0 %	0 %
Utilities	1 %	1 %
Mining	0 %	0 %
Arts, entertainment and recreation	1 %	2 %
Transportation and warehousing	4 %	4 %
Retail trade	11 %	12 %
Construction	6 %	7 %
Information	2 %	3 %
Finance and insurance	4 %	5 %
Professional, scientific and technical services	3 %	6 %
Manufacturing	8 %	14 %

Source: Census 2000 SF3 Table P49.

Figure 3- 3 displays the number and type of firms operating in Fresno, Madera, and Mariposa counties. Again, the **arts, entertainment and recreation, and retail trades** (those firms that provide motor vehicle products) sectors are the two sectors most likely to be affected by decisions made in this document.

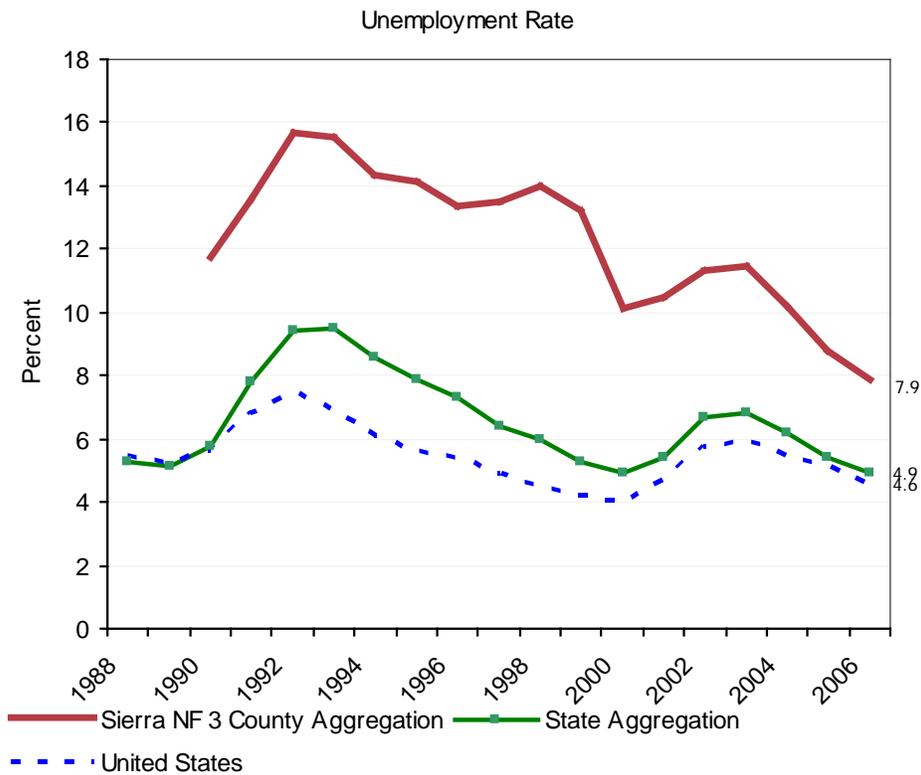
Figure 3- 3. SNF Region Firms by Industry in 2005 (NAICS)



Unemployment

In 2006, the unemployment rate was 7.9 percent, compared to 4.9 percent in the State and 4.6 percent in the Nation. Since 1990, the unemployment rate varied from a low of 7.9 percent in 2006 to a high of 15.6 percent in 1992 (Figure 3- 4).

Figure 3- 4. Unemployment Rate

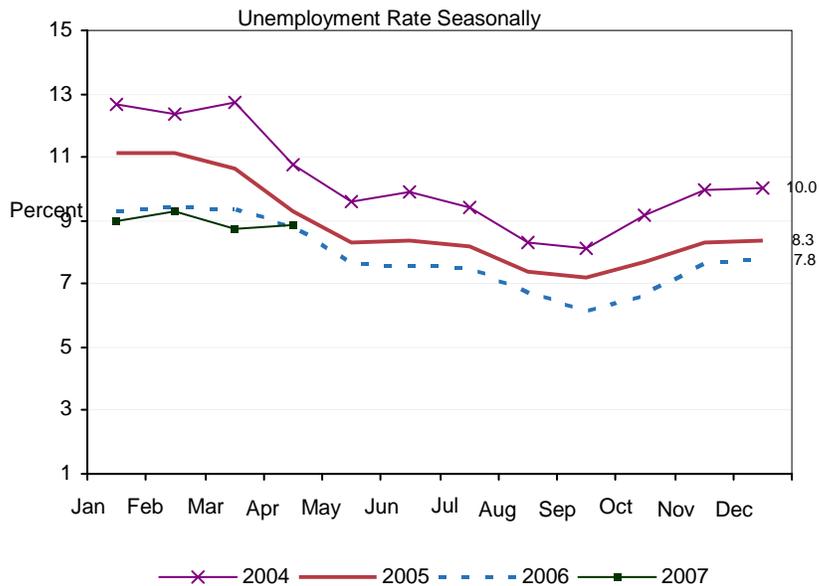


Source: Bureau of Labor Statistics

Seasonal Employment

Figure 3- 5 illustrates the seasonal variation in the unemployment rate over the last 3 years. In 2006, the unemployment rate varied from a low of 6.2 percent in September 2006 to a high of 9.4 percent in February 2006.

Figure 3- 5. Unemployment Rate Seasonally



Source: Bureau of Labor Statistics

Employment and Income: Environmental Consequences Common to All Analysis Units

Economic Impacts

The assessment of economic impacts attempts to identify potential effects that Forest Service management may have on local, county and regional economic systems and on people using the natural resources that the SNF provides. In particular, would changes in the use of the National Forest for recreation and the amount of change in the designation of forest roads and trails be large enough or significant enough to cause measurable economic changes? Is the economy of the local area diverse enough and robust enough that the proposed changes will be insignificant or will they be felt in very specific segments of the local economy?

National Visitor Use Monitoring (NVUM)

The NVUM program provides reliable information about recreation visitors to National Forest System lands at the National, regional and forest level. Information about the quantity and quality of recreation visits is required for National Forest plans, Executive Order 12862 (Setting Customer Service Standards) and implementation of the National Recreation Agenda. To improve public service, the Agency’s Strategic and Annual Performance Plans require measuring trends in user satisfaction and use levels. NVUM information assists Congress, Forest Service leaders and program managers in making sound decisions that best serve the public and protect valuable natural resources by providing science based, reliable information about the type, quantity, quality and location of recreation use on public lands. The information collected is also important to external customers including State agencies and private industry. NVUM methodology and analysis is explained in detail in the research paper entitled “Forest Service National Visitor Use Monitoring Process: Research Method Documentation; English, Kocis, Zarnoch and Arnold; Southern Research Station (May 2002).”

The SNF participated in the NVUM project from October 2002 through September 2003 and again from October 2006 through September 2007. At the time of this analysis, the full data was not available from the 2007 NVUM for the SNF. The 2002 data estimated 1,871,540 National Forest visits on SNF; the 2007 data estimated approximately 500,000 fewer visits. The full SNF NVUM report is available on the Web through the Natural Resource Information System (NRIS) Human Dimensions Module from the Forest Service (www.fs.fed.us/recreation/programs/nvum) (USDA-FS 2008).

Table 3- 21 presents participation rates by activity for the SNF during the NVUM survey period. The Total Activity Participation (percent) column of the table presents the participation rates by activity. Participation rates will exceed 100 percent since visitors can participate in multiple activities. The Percent as Main Activity column presents the participation rates in terms of primary activity.

The primary activity participation rates (Percent as Main Activity) were used to estimate use by activity emphasis. The emphasis areas were grouped into those emphasizing non-motorized, motorized and other activities. Motorized activities were those that used motor vehicles on NFTS roads and trails. Non-motorized activities still used forest roads and trails, but on foot or by non-motorized transportation such as cross-country skis or bicycles. All other activities are all the other forest based activities measured by the NVUM survey that didn't utilize roads or trails to pursue their primary activity. Examples of "other" are downhill skiing, motorized water activities, etc. Motor vehicles may have been used to reach a destination or participate in the activity, but it was not the primary emphasis of the visit.

Table 3- 21. Activity Participation on SNF (2007)

Activity	Activity Emphasis for Road & Trail Use	Total Activity Participation (percent) ^{1/2}	Percent as Main Activity (percent) ^{3/4}
Snowmobiling	Motorized	1.2	1.1
Driving for Pleasure	Motorized	13.6	1.6
OHV Use	Motorized	1.6	0.1
Other Motorized Activity	Motorized	1.7	0.5
Motorized Subtotal			3.3
Hiking / Walking	Non-motorized	40.5	16.1
Bicycling	Non-motorized	3.0	0.9
Other Non-motorized	Non-motorized	43.8	33.8
Cross-country Skiing	Non-motorized	2.8	2.6
Backpacking	Non-motorized	3.6	1.1
Horseback Riding	Non-motorized	1.4	0.6
Non-motorized Subtotal			55.1
Downhill Skiing	Other	9.4	8.4
Fishing	Other	12.3	5.2
Viewing Natural Features	Other	51.3	14.1
Relaxing	Other	48.7	7.4
Motorized Water Activities	Other	6.6	2.3
Hunting	Other	0.0	0.0
Non-motorized Water	Other	4.4	2.7
Developed Camping	Other	11.6	1.8
Primitive Camping	Other	2.0	0.1
Picnicking	Other	20.6	2.7
Viewing Wildlife	Other	21.6	0.3
Sightseeing	Other	0.0	0.0
No Activity Reported	Other	4.1	4.1
Resort Use	Other	3.9	0.0
Visiting Historic Sites	Other	4.8	0.0
Nature Study	Other	7.6	0.0
Gathering Forest Products	Other	4.3	0.1
Nature Center Activities	Other	2.9	0.0
Other Subtotal			49.2
Total			107.6

¹ Survey respondents could select multiple activities so this column may total more than 100%.

² The number in this column is the percent of survey respondents who indicated participation in this activity.

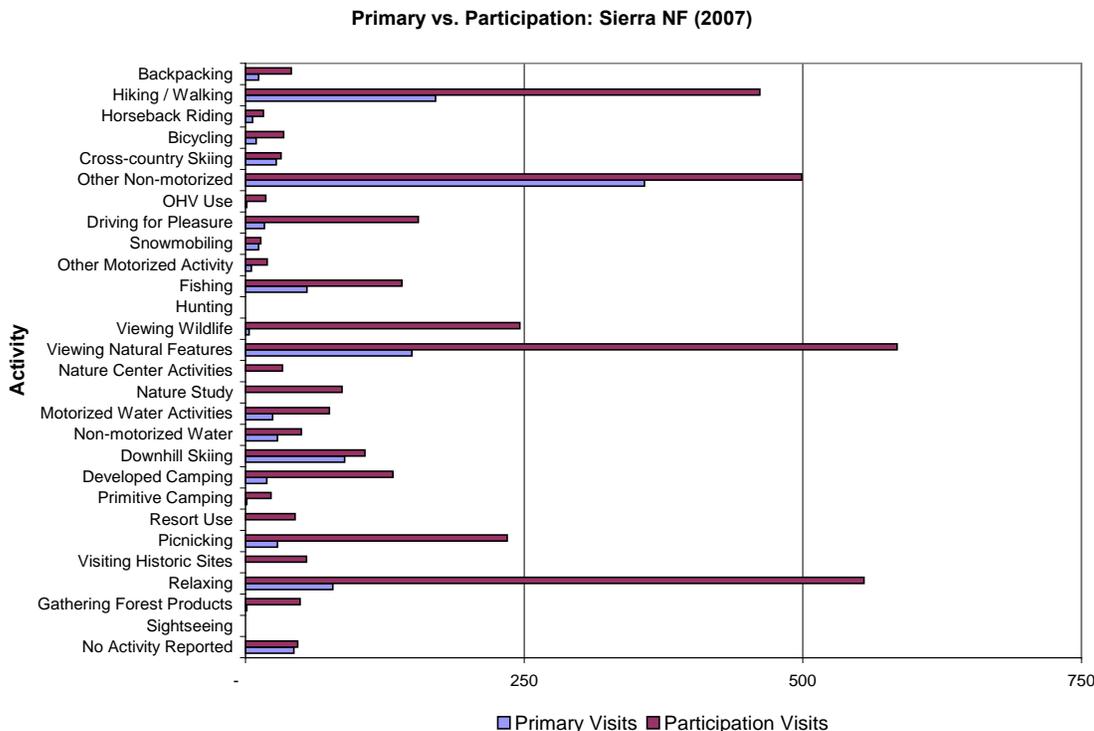
³ Survey respondents were asked to select just one of their activities as their main reason for the forest visit. Some respondents selected more than one, so this column may total more than 100%.

⁴ The number in this column is the percent of survey respondents who indicated this activity was their main activity.

Source: USDA-FS 2008

Figure 3- 6 charts the participation rate of visitors in primary activities and participation activities. In general, non- motorized uses had higher primary and participation visits than motorized uses on the SNF in 2007.

Figure 3- 6. Primary vs. Participation: SNF (2007)



The total estimated number of visits as reported in the MVUM for the SNF in 2003 was 1,871,540 for 2003 and 1,139,500 in 2007.

Table 3- 22 displays the percent participation on the SNF for SNF activities. Users were determined to be either local or non-local based on the miles from the user’s residence to the forest boundary. If the user reported living within 50 miles of the SNF boundary, they are considered local; if over 50 miles, they are considered non-local. It is critically important to distinguish between local and non-local spending as only non-locals bring new money and new economic stimulus into the local community. Local spending is already accounted for in the study area base data. It is impossible to predict how locals would have spent money if they didn’t have local recreation opportunities on the National Forest, but it’s a safe guess that much of that money would not have been lost to the local economy. People tend to substitute other local recreation activities or change the time or place for continuing the same activity rather than traveling long distances and incurring high costs to do the same activity. The table indicates the most popular non-motorized use is hiking and walking. The most popular motorized use is driving for pleasure.

Table 3- 22. Number of Party Trips by Activity (2007)

	Use (Party-Trips) ¹				
	Non-local Day Use	Non-local Overnight	Local Day use	Local Overnight	Non-Primary
Non-motorized					
Hiking/Walking	6,495	12,602	59,675	4,650	3,789
Bicycling	363	704	3,336	260	212
Other Non-motorized	13,636	26,457	125,281	9,762	7,954
Cross-country Skiing	983	3,048	6,465	479	110
Backpacking	0	2,106	0	2,285	101
Horseback Riding	242	470	2,224	173	141
Motorized					
Snowmobiling	371	606	2,887	541	485
Driving for Pleasure	484	587	6,684	231	777
OHV Use	55	97	254	74	16
Other Motorized Activity	277	487	1,271	371	81
Other					
Fishing	3,029	5,746	13,112	2,423	1,049
Hunting	0	0	0	0	0
Viewing Wildlife	127	294	534	93	188
Motorized Water Activities	1,276	2,241	5,846	1,705	375
Non-motorized Water	1,089	2,113	10,008	780	635
Downhill Skiing	2,965	6,989	17,791	5,693	1,534
Developed Camping	635	1,498	3,812	1,220	329
Primitive Camping	0	191	0	208	9
Resort Use	0	0	0	0	0
Picnicking	953	2,247	5,719	1,830	493
Viewing Natural Features	5,973	13,826	25,086	4,355	8,849
Visiting Historic Sites	0	0	0	0	0
Nature Center Activities	0	0	0	0	0
Nature Study	0	0	0	0	0
Relaxing	2,612	6,157	15,673	5,015	1,351
Gathering Forest Products	35	83	212	68	18
Sightseeing	0	0	0	0	0
No Activity Reported	1,447	3,412	8,684	2,779	749
Sub Total	37,983	89,532	227,900	72,928	19,647

¹A Party-Trip is equal to the number of visits divided by the average party size for that activity and segment (Local Day, Local Overnight, etc.).

Table 3- 23 indicates that motorized day use expenditures are generally higher than for non-motorized activities, but non-local overnight visitors engaged in non-motorized activities generally expend more than non-local motorized users (except for snowmobiling). Snowmobilers spend the most per visit, especially non-local visitors.

Table 3- 23. Expenditures by Activity (2007)

	Expenditures (money spent per visit 2007 dollars)				
	Non-local Day Use	Non-local Overnight	Local Day use	Local Overnight	Non-Primary
Non-motorized					
Hiking/Walking	17.62	106.96	11.11	39.55	7.41
Bicycling	17.62	106.96	11.11	39.55	7.41
Other Non-motorized	17.62	106.96	11.11	39.55	7.41
Cross-country Skiing	18.93	119.64	14.78	87.39	13.60
Backpacking	0.00	19.09	0.00	24.10	0.00
Horseback Riding	17.62	106.96	11.11	39.55	7.41
Motorized					
Snowmobiling	49.09	128.80	29.57	68.93	28.33
Driving for Pleasure	17.62	66.54	13.33	42.73	10.00
OHV Use	28.57	64.80	19.00	48.50	14.62
Other Motorized Activity	28.57	64.80	19.00	48.50	14.62
Other					
Fishing	21.00	95.65	20.00	48.00	20.00
Hunting	38.10	116.32	30.00	79.47	25.50
Viewing Wildlife	20.80	82.59	10.80	53.75	10.00
Motorized Water Activities	18.52	70.36	15.00	49.20	12.41
Non-motorized Water	18.52	70.36	15.00	49.20	12.41
Downhill Skiing	36.36	117.93	25.24	89.13	27.89
Developed Camping	0.00	50.36	0.00	41.29	0.00
Primitive Camping	0.00	19.09	0.00	24.10	0.00
Resort Use	18.52	70.36	15.00	49.20	12.41
Picnicking	18.52	70.36	15.00	49.20	12.41
Viewing Natural Features	18.52	70.36	15.00	49.20	12.41
Visiting Historic Sites	18.52	70.36	15.00	49.20	12.41
Nature Center Activities	18.52	70.36	15.00	49.20	12.41
Nature Study	18.52	70.36	15.00	49.20	12.41
Relaxing	18.52	70.36	15.00	49.20	12.41
Gathering Forest Products	18.52	70.36	15.00	49.20	12.41
Sightseeing	18.52	70.36	15.00	49.20	12.41
No Activity Reported	18.52	70.36	15.00	49.20	12.41

The employment and labor income effects stemming from current motorized and non-motorized activities occurring on the SNF were estimated. The economic effects of all other types of recreation combined on the SNF have also been reported for comparison purposes. Economic effects tied to motorized and non-motorized activities were estimated to address the economic impact issue tied directly to access and travel management. Also, the marginal economic effects (employment and labor income effects per 1,000 visits) of motorized and non-motorized use are provided. The marginal effects (also called “response coefficients”) are useful for performing sensitivity analyses of various management alternatives.

Response Coefficients by Activity Type

Table 3- 24 displays the estimated employment and labor income response coefficients (employment and labor income per 1,000 visits) by local and non-local activity types. The response coefficients indicate the number of full and part-time jobs and dollars of labor income per thousand visits by activity type. The response coefficients are useful in: 1) understanding the economic effects tied to a given use level; 2) understanding projected employment effects for

various use scenarios (sensitivity analysis); and 3) understanding the differences in employment effects by activity type. The response coefficients displayed in Table 3- 24 along with the visits presented in Table 3- 24 were used to estimate the economic effects for local and non-local use by activity type.

Table 3- 24 indicates the following: First, economic effects tied to local visitation generate lower employment and labor income effects. This is a result of local visitors spending less per visit in comparison to non-local visitors (see Table 3- 23). Second, economic effects vary widely by motorized and non-motorized activity types. The lowest employment effect is tied to local hiking, walking, bicycling, other non-motorized recreation and horseback riding activities (Note: the economic effects are identical for these categories since they share the same spending profile). Third, the largest economic effect is associated with non-local cross-country skiing, but is followed fairly closely by non-local snowmobiling. In general, economic effects vary by the amount of spending and by the type of activity, but it cannot be generalized that motorized or non-motorized activities contribute more or less to the local economy on a per visit basis. It is also important to be careful with the use of response coefficients. They reflect an economic structure that is a snapshot in time, that is, they are not applicable to visitation numbers that are dramatically different from current recreation levels. If recreation activities and/or visits were to change radically, there would be a structural shift in the economy as spending patterns changed and these response coefficients would no longer reflect underlying economic processes.

Table 3- 24. Employment and Labor Income Response Coefficients by Activity Type (2007)

		Employment (Jobs per 1,000 Party-Trips)		Labor Income (2006 dollars) (\$ per 1,000 Party-Trips)	
		Direct Effects	Indirect and Induced Effects	Direct Effects	Indirect and Induced Effects
Non-motorized Use					
Hiking/ Walking, Bicycling, Horseback Riding, Other Non-motorized	Local Day	0.170	0.075	\$4,178	\$2,817
	Local Overnt	0.768	0.349	\$19,511	\$13,189
	NonLocal Day	0.386	0.156	\$9,451	\$5,681
	NonLocal Overnt	2.506	1.055	\$61,439	\$39,436
	NP	0.170	0.075	\$4,178	\$2,817
Backpacking	Local Day	-	-	\$0	\$0
	Local Overnt	0.695	0.355	\$18,916	\$13,646
	NonLocal Day	-	-	\$0	\$0
	NonLocal Overnt	0.901	0.416	\$24,645	\$15,336
	NP	0.695	0.355	\$18,916	\$13,646
Motorized Use					
OHV Use	Local Day	0.291	0.134	\$7,439	\$5,052
	Local Overnt	0.794	0.365	\$20,021	\$13,963
	NonLocal Day	0.457	0.210	\$11,694	\$7,942
	NonLocal Overnt	1.323	0.609	\$33,370	\$23,273
	NP	0.291	0.134	\$7,439	\$5,052
Driving	Local Day	0.196	0.082	\$4,691	\$3,100
	Local Overnt	1.136	0.445	\$25,415	\$16,797
	NonLocal Day	0.308	0.129	\$7,378	\$4,875
	NonLocal Overnt	1.893	0.742	\$42,365	\$27,999
	NP	0.196	0.082	\$4,691	\$3,100
Snowmobile	Local Day	0.517	0.234	\$13,251	\$8,777
	Local Overnt	2.056	0.820	\$45,935	\$31,043
	NonLocal Day	0.872	0.391	\$22,089	\$14,619
	NonLocal Overnt	3.426	1.366	\$76,562	\$51,741
	NP	0.517	0.234	\$13,251	\$8,777
Cross-country Ski	Local Day	0.325	0.141	\$7,537	\$5,332
	Local Overnt	2.133	0.880	\$50,184	\$33,092
	NonLocal Day	0.511	0.221	\$11,839	\$8,377
	NonLocal Overnt	3.556	1.467	\$83,646	\$55,156
	NP	0.325	0.141	\$7,537	\$5,332
All Other Use					
	Local Day	0.276	0.135	\$8,266	\$4,841
	Local Overnt	0.986	0.522	\$33,684	\$18,055
	NonLocal Day	2.028	0.956	\$64,458	\$32,324
	NonLocal Overnt	1.995	0.748	\$66,697	\$26,014
All Other Activities	NP	0.276	0.135	\$8,266	\$4,841
All Other Activities includes Developed Camping, Primitive Camping, Resort Use, Picnicking, Viewing Natural Features, Visiting Historic Sites, Nature Center Activities, Nature Study, Relaxing, Fishing, Hunting, Motorized Water Activities, Non-motorized Water, Downhill Skiing, Gathering Forest Products, Viewing Wildlife, Sightseeing and No Activity Reported.					

Motorized and Non-motorized Use

Table 3- 25 displays the estimated employment and labor income effects for current use levels reported by NVUM for local and non-local non-motorized and motorized activities. Table 3- 26 expresses these employment and labor income effects as a percent of total employment and income for each activity. In general, the estimated economic effects are a function of the number of visits and the dollars spent locally by the visitors. For example, non-local users typically spend more money per visit than local users. Also, activities that draw more users will be responsible for more economic activity in comparison to activities that draw fewer users, holding constant spending per visit. Given that the analysis is dependent on visitation and expenditure estimates, any changes to these estimates affect the estimated jobs and labor income.

Table 3- 25 indicates that approximately 151 total average annual jobs in the three county area (direct, indirect and induced, full-time, temporary and part-time) and \$4.4 million total labor income (direct, indirect and induced) are attributable to non-motorized visitation on the SNF. The two largest activities among those in the table are hiking, walking and cross-country skiing, together these account for about 53 percent of the jobs and 44 percent of the income generated from the activities analyzed. These activities account for about 80 jobs and provided \$2.3 million in labor income to the three-county area.

Motorized activities were responsible for approximately 14 total jobs (direct, indirect and induced) and \$400 thousand total labor income (direct, indirect and induced). The two largest motorized uses are driving for pleasure and snowmobiling. Motorized activities combined contribute about 2.3 percent of the jobs and about 2 percent of the labor income resulting in the three-county aggregate from recreational activities on the SNF in 2007.

Table 3- 25. Employment and Labor Income Effects by Activity Type (2007)

	Employment		Labor Income	
	(full & part-time jobs)		(2008 dollars)	
	Direct	Indirect & Induced	Direct	Indirect & Induced
Non-Motorized Use				
Backpacking - Local	2	1	\$44,744	\$32,278
Non-local	2	1	\$53,723	\$33,431
Hiking/Walking - Local	14	6	\$352,011	\$237,484
Non-local	34	14	\$865,039	\$552,656
Horseback Riding - Local	1	0	\$13,118	\$8,850
Non-local	1	1	\$32,237	\$20,596
Bicycling - Local	1	0	\$19,678	\$13,275
Non-local	2	1	\$48,356	\$30,894
Cross-country Skiing - Local	3	1	\$75,310	\$52,087
Non-local	11	5	\$276,006	\$182,580
Other Non-motorized - Local	29	13	\$739,005	\$498,568
Non-local	72	30	\$1,816,045	\$1,160,234
Total Non-motorized	171	73	\$4,335,273	\$2,822,934
Subtotal	243		\$7,158,206	
Motorized Use				
OHV Use - Local	0	0	\$3,494	\$2,401
Non-local	0	0	\$4,037	\$2,803
Driving for Pleasure - Local	2	1	\$38,537	\$25,464
Non-local	1	0	\$29,419	\$19,442
Snowmobiling - Local	3	1	\$65,318	\$43,611
Non-local	2	1	\$56,484	\$38,054
Other Motorized Activity - Local	1	0	\$17,468	\$12,004
Non-local	1	0	\$20,185	\$14,016
Total Motorized	10	4	\$234,942	\$157,795
Subtotal	14		\$392,736	
All Other Use				
All Other Activities - Local	80	39	\$2,507,364	\$1,456,756
Non-local	174	70	\$5,457,478	\$2,596,998
Total Other	254	110	\$7,964,842	\$4,053,754
Subtotal	364		\$12,018,596	
Grand Total	434	187	\$12,535,056	\$7,034,482
Grand subtotal	621		\$19,569,538	

Table 3- 26 and Table 3- 27 show the relationship of jobs and income generated from all recreation activities studied compared to total jobs and income in the three County area. All of the jobs related to recreation activities on the SNF together account for about 0.1 percent of the total jobs in the area and the income generated is about 0.1 percent of the total labor income in the area studied.

Table 3- 26. Total Employment and Labor Income Effects

		Employment Effects	Labor Income
		(full and part time jobs)	(2008 dollars)
Total Non-Motorized Use	Local	70	2,086,409
	NonLocal	173	5,071,797
Total Motorized Use	Local	7	208,296
	NonLocal	6	184,441
Total All Other Use	Local	119	3,964,120
	NonLocal	245	8,054,476
Total	Local	196	6,258,825
	NonLocal	425	13,310,714
Total for Area		621	19,569,538

Table 3- 27. Current Role of Forest Service Recreation-Related Contributions to the Area Economy (2007)

Industry	Employment (jobs)		Labor Income (millions of dollars)	
	Area Totals	FS-Related	Area Totals	FS-Related
Agriculture	72,871	16	\$2,225	\$0.411
Mining	235	0	\$15	\$0.034
Utilities	1,799	1	\$191	\$0.089
Construction	34,611	4	\$1,927	\$0.206
Manufacturing	32,899	19	\$1,873	\$0.856
Wholesale Trade	16,503	31	\$978	\$1.854
Transportation & Warehousing	16,716	20	\$849	\$1.080
Retail Trade	49,908	78	\$1,564	\$2.416
Information	5,221	8	\$351	\$0.446
Finance & Insurance	16,102	11	\$876	\$0.637
Real Estate & Rental & Leasing	13,886	29	\$407	\$0.852
Prof, Scientific, & Tech Services	20,432	21	\$1,026	\$0.907
Mngt of Companies	4,542	4	\$219	\$0.226
Admin, Waste Mngt & Rem Serv	23,053	19	\$650	\$0.523
Educational Services	5,952	5	\$120	\$0.102
Health Care & Social Assistance	52,319	24	\$2,469	\$1.124
Arts, Entertainment, and Rec	5,474	54	\$103	\$1.189
Accommodation & Food Services	31,263	294	\$581	\$5.850
Other Services	32,135	18	\$764	\$0.458
Government	75,399	29	\$4,811	\$2.552
Total	511,320	685	\$21,999	\$21.812
FS as Percent of Total	---	0.13%	---	0.10%

Predictions about changes in recreational use that may occur on the SNF are difficult to make and would be highly speculative. The Forest Service believes that under all action alternatives, levels of use would be relatively static although the use patterns may change. For example, even though the overall number of available roads and trails is reduced in all of the action alternatives, the same levels of use would simply become more concentrated in those areas. However, motor

vehicle use is already concentrated in many areas of the SNF at this time, so this effect may not be realized either during implementation; but at some point, some users would no longer attain the experience they desire and would likely seek other areas off-forest. The point at which this would occur is speculative.

Compared to the no action alternative (Alternative 1) elimination of cross-country travel to motorized use all other alternatives are likely to have some level of impact to the local economy. Yet, this effect, again, is nearly immeasurable in relationship to the overall economy in the area. Any potential effects would likely impact gas stations, convenience stores and other retail stores in local communities.

Roads and Trails Budget Projections

The road system was largely constructed as a component of timber sales. When the timber harvest was significant on the SNF, the roads were built, improved and maintained as part of the timber sale. Currently, most road work is funded by appropriated funds through the Congressionally-approved budget. Special capital improvement funds and other earmarked funds improve roads within identified projects or areas.

Trail funding has historically been used to maintain trails located in designated wilderness areas. Motorized and non-motorized trails have been maintained by several volunteer groups. The value of this service is noted in Table 3- 28, but is not added to the sums per year. Motorized trail maintenance is funded, in part, through State of California, Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division Grants and Cooperative Agreements. Funding from grants and agreements is not consistent, due to changing criteria and available funds. The inconsistent funding has contributed to an increase in deferred maintenance for opportunities managed as motorized trails.

Table 3- 28. Road and Trail Construction and Maintenance Budget

Fiscal Year	Roads Total ¹	Road Maintenance ²	Trails Total ³	OHV Grants Total ⁴	OHV Routes Maintained
FY04	\$652,000	\$350,000	\$87,000	\$114,000	\$18,000
FY05	\$555,000	\$300,000	\$150,000	\$216,000	\$25,000
FY06	\$675,000	\$350,000	\$118,000	-0-	-0-
FY07	\$518,000	\$345,000	\$38,000	\$120,000	\$7,000
FY08	\$501,000	\$325,000	\$143,000	\$241,000	\$43,000
Additional source of maintenance: A number of trails have been adopted by OHV clubs who provide trail maintenance. The value for volunteers on Motorized trail and area maintenance ranges from \$10,000 to \$15,000.					

¹Roads Total include the Congressional appropriated funds the SNF receives for the management, operation and maintenance of the SNF road system;

²Road Maintenance is the amount of the appropriated funds dedicated to actual road maintenance activities;

³Trails Total is the total appropriated funds received on the SNF. Total funds include earmarks for capital investment or are project specific and may not result in on-the-ground trail maintenance.

⁴OHV State of California grant funding for Operations and Maintenance, includes enforcement and trail maintenance

Appropriated funding has been uneven over the past 5 years and no prediction or trend is apparent. Appropriated funding alone is not adequate to sustain the system in the long run. If this funding does not increase in the future, the SNF will need to rely on outside funding sources, partnerships and volunteers to accomplish this work.

American Indian Rights and Interests: Affected Environment Common to All Analysis Units

Laws Pertaining to American Indian Tribes

Laws pertaining to the rights of Federally-recognized American Indian tribes acknowledge that these tribes have specific rights and interests, many unlike those accorded to other governments. Most American Indian lands in California are small. American Indians in California rely on Federal lands for exercising their interests and rights to access and use natural resources, cultural resources and ceremonial sites and to seek economic well-being (Reynolds 1996). An important distinction in U.S. law is that Federally-recognized American Indian tribes are not a special interest group; they are sovereign governments distinct from Federal and State governments. This legal standing confers government-to-government relations between the Federal Government and each Federally-recognized tribe. Powers that Federal laws do not expressly limit remain inherent powers of individual tribes. Reservations, Rancheria and Indian colonies all comprise “Indian Country” as defined in the 1948 Indian Country Statute. American Indian governments have jurisdiction and authority over resources on Indian Country lands. On lands outside Indian Country, rights reserved for tribal governments may include rights to hunt and fish; rights to gather traditional plants, mushrooms and lichens; and rights to water. Federal policy for tribes emphasizes self-determination and government-to-government relationships. Table 3- 29 lists major laws that shape how the Federal government supports tribal self-determination interests and government-to-government consultation. In addition, a long tradition of case law has defined reserved rights for American Indians, including water rights and trust responsibility of the Federal government, among others (Getches and others 1998).

Table 3- 29. Federal Laws Relevant to American Indian Concerns Regarding National Forest Management

Law	Purpose
National Environmental Policy Act of 1969	Requires consideration of effects on cultural values and diversity.
American Indian Religious Freedom Act of 1978, as amended in 1994	Protects Indian religious practices and access to sacred sites.
Federal Land Policy and Management Act of 1976	Coordinates with Indian tribes to inventory, plan and manage resources of value to Tribes.
National Historic Preservation Act of 1966, as amended	Accounts for impacts of management on prehistoric and historic sites.
Archeological Resources Protection Act of 1979 as amended in 1992	Protects archeological resources and requires that affected tribes be notified if archeological studies might harm or destroy culturally or spiritually important sites.
Native American Graves Protection and Repatriation Act of 1990	Requires consultation with tribes about disposition of Native American remains, funerary objects and other cultural relics.

American Indian groups exert influences at National, regional and local levels. For this EIS, their influence is most pronounced at the local level. The Forest Service consults with Federally-recognized tribes, non-recognized tribes organizations and individuals to comply with the laws displayed in Table 3- 29.

There are five (5) Federally-recognized Indian tribes known to the Bureau of Indian Affairs (BIA) near the SNF:

1. Cold Springs Rancheria of Mono Indians
2. Big Sandy Rancheria of Mono Indians
3. North Fork Rancheria of Mono Indians
4. Picayune Rancheria of Chukchansi Indians
5. Table Mountain Rancheria

There are (5) Tribes striving for Federal Recognition status:

1. North Fork Mono Tribe
2. American Indian Council of Mariposa County (Southern Sierra Miwuk Nation)
3. Dunlap Band of Mono Indians
4. Dumna Wo-Wah Tribal Government
5. Chaushilha Yokuts

American Indian people make up approximately one percent of the total population within the SNF Region.

Importance of National Forest Lands and Resources to American Indian People

Indian country is a complex pattern of reservations, Rancherias and allotments scattered throughout the Sierra Nevada. American Indian people most associated with the SNF lands live principally in the foothill communities of the west slope of the Sierra Nevada range. Some American Indian communities and individuals reside off the Rancherias while others live on allotments within National Forests administrative boundaries or near rural communities. Many American Indians have also migrated to nearby urban centers. The tribes discussed in this section continue to maintain their cultural identities while participating in many day-to-day social and economic activities of other communities.

Tribal concerns related to this EIS have been shared with the Forest Service at public and tribal meetings. Key tribal concerns include: road access and special lands and their associated activities.

Road Access

Many ceremonial locations, cemeteries, traditional gathering areas and archaeological sites are located in the National Forests. These areas contribute to the tribal community's way of life, their identity, their traditional practices and cohesiveness. While roads were not a traditional means of access to these sites they are essential for many now. Some Indian people have expressed concern about potential changes in roaded access to these sites. At the March and December 2008 tribal meeting some of the tribal representatives expressed agreement on managing motor vehicle access to certain areas on the forest (they wanted the access closed), as this unmanaged access was a negative impact on certain gathering areas and sacred sites.

Special Lands and Associated Activities

Many sacred areas are located in National Forests. Ceremonial activities are held in these areas. Occasionally, ceremonial activities are held with little notice to the Forest Service and, at other times, these activities are large gatherings attended by tribes and the general public. Some

activities, particularly those of a religious nature, must be performed in specific settings or environments.

The designation of “sacred” lands is tribally based. According to some traditions, the Creator designated sacred lands. These lands are often situated in areas with unique and fixed geological features or other landscape attributes. Many American Indians consider major land alterations, such as clear cutting, road building or mining, on sacred lands to be disrespectful. Certain activities are also considered disrespectful (e.g. hunting bear during traditional Bear Dance Celebrations). At least two traditional gatherings are held on the SNF annually.

As more people visit and use National Forests, conflicts arise between tribal uses of culturally important areas and other uses of these same areas. The unique characteristics of culturally important areas attract many people for many different reasons. Some of these areas are currently experiencing increased recreational use that, at times, conflicts with tribal uses. In the past, some campgrounds were located on tribal sites and some roads were located on prehistoric and historic trails, further illustrating the critical need for local consultation between the Forest Service and American Indian tribes.

American Indian Rights and Interests: Environmental Consequences

Factors Used to Assess Environmental Consequences

Tribal input provided to the Forest Service during pre-scoping and scoping for this EIS identified a goal for providing appropriate access to sacred sites, ceremonial sites and traditional use areas. Access to traditional use areas is not presently quantifiable in the absence of baseline inventories. Therefore, the factor used to assess the consequences of the alternatives is the total miles of roads and trails open to wheeled motor vehicles and season of use. The Cultural Resources section of Chapter 3 describes consequences to traditional cultural resources such as archaeological sites, and historic sites.

Access by American Indians. Concerns were raised by American Indians and tribal representatives that this proposal would unduly restrict access to sacred sites or traditional gathering areas that are accessed via motorized cross-country travel, including unauthorized routes. Elderly or infirm tribal members may be prevented from participating in tribal activities if motor vehicle access is denied. Such access has been traditionally granted as long as resource damage can be prevented.

Motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations is exempt from route designations (36 CFR 212.51 (8)). Therefore, motor vehicle access to sacred sites or gathering areas may be authorized by the Forest Service and will not be affected by this proposal.

Effects of the Alternatives on American Indian Rights and Interests

Of the action alternatives, Alternative 5 would result in the greatest total miles of roads and motorized trails on the SNF. Alternatives 2, 3 and 4 provide lower levels of access in terms of total miles. Access in Alternatives 2, 3 and 4 is reduced further due to the implementation of wet weather seasonal restrictions. Alternative 3 would result in the fewest miles of motorized roads and trails and is therefore the alternative that responds best to concerns brought up by American Indian interests.

Civil Rights Impact Analysis

USDA civil rights policy requires each agency to analyze the civil rights impact(s) of policies, actions, or decisions that will affect federally conducted and federally assisted programs and activities. A civil rights impact analysis (CRIA) facilitates the identification of the effects of eligibility criteria, methods of administration, or other agency-imposed requirements that may adversely and disproportionately impact employees or program beneficiaries based on their membership in a protected group. Protected groups include multiples of similarly situated persons who may be distinguished by their common race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetics, political beliefs, or receipt of income from any public assistance program.

Environmental justice speaks to concerns that costs of Federal decisions could fall disproportionately on people of a particular ethnic or cultural heritage group or on people with low incomes. Executive Order 12898 requires Federal agencies to identify where such disproportionate burdens might occur as the result of Federal actions.

Restrictions on motor vehicle use that are applied consistently to everyone are not discriminatory. However, some groups could be impacted more than others. This assessment addresses such concerns.

1. Public Involvement and Scoping

Public involvement concerning this proposal focused on the identification of unauthorized routes and assessing the effects of prohibiting cross-country motorized travel on forest users. Reference Chapter 1 of this FEIS for discussion of public involvement opportunities and efforts.

2. Concerns and Mitigations Related to Potential Civil Rights Impacts

Through these public involvement efforts and interdisciplinary discussions, several concerns were raised and are addressed below:

A. Gathering Special Forest Products. It is known that many people, including members of protected groups, use motor vehicles to gather special forest products including mushrooms, greenery, firewood, posts, poles, etc. Such products are gathered for both personal and commercial use. Some protected groups are known to be very active in gathering certain special forest products. Concerns have been raised that the prohibition on cross-country travel will restrict such activities to designated roads or trails, limit people's ability to gather such products and disproportionately impact protected groups.

Currently, under 36 CFR 261.6, removing any timber, tree or other forest product, except as authorized by a special-use authorization, timber sale contract, or Federal law or regulation is prohibited.

Gathering special forest products requires written authorization by the Forest Service. Such permitted activities are exempt from the prohibition on cross-country travel in accordance with provisions of the permit (36 CFR 212.51 (8)). Such activities have been, and will continue to be, subject to separate, site-specific National Environmental Policy Act analysis, before permits are issued. This proposal does not change that policy. Permits will continue to be issued in accordance with law, regulation and policy regardless of this proposal. Therefore, it is not expected that gathering special forest products will be affected by this proposal or that any protected groups will be disproportionately affected.

B. Impacts on People with Disabilities and the Elderly. Concerns have been raised about the impact of this travel management proposal on people with disabilities and the elderly. Commenters have asserted that the proposal unfairly discriminates against these groups because they are more dependent on motor vehicles to access and enjoy our National Forests.

Implementation of the Travel Management Rule, Subpart B, including the prohibition of cross-country travel, is forestwide and applies to all forest users equally. There is no legal requirement to allow people with disabilities to use motor vehicles on roads, on trails, and in areas that are closed to motor vehicle use. Restrictions on motor vehicle use that are applied consistently to everyone are not discriminatory. Generally, granting an exemption from designations for people with disabilities would not be consistent with the resource protection and other management objectives of travel management and would fundamentally alter the nature of the Forest Service's travel management program (29 U.S.C. 794; 7 CFR 15e.103).

Under section 504 of the Rehabilitation Act of 1973, no person with a disability can be denied participation in a Federal program that is available to all other people solely because of his or her disability. Consistent with 36 CFR 212.1, FSM 2353.05, and Title V, Section 507(c), of the Americans With Disabilities Act, wheelchairs and mobility devices, including those that are battery-powered, that are designed solely for use by a mobility-impaired person for locomotion and that are suitable for use in an indoor pedestrian area are allowed on all NFS lands that are open to foot travel.

C. Barriers to Communication The National Environmental Policy Act (NEPA) mandates that the Forest Service actively reach out to members of the public, including those people whom the Forest Service has historically underserved. There are several minority groups in the service area of the SNF. SNF policy and practice is to actively reach out to the full range of minority groups in the service area by providing press releases and engaging in interactive relationships.

In the public comment period between the appearance of the draft EIS and the final EIS, SNF staff participated in events (e.g. Hmong Festival, date), contacted visitors in the field, and worked with businesses to disseminate information See Public Comment summary in Chapter 1 of this FEIS for further information.

D. Public Safety Small communities living within or near the SNF boundary (especially the community of El Portal) expressed concern that unmanaged motor vehicle access increased the risk of wildfire ignition and/or illegal drug operations. For the years 1999-2007 there have been 860 total wildfires on the SNF. It is documented that five percent of those were started by equipment (including construction, chainsaws and motor vehicles).

Over the past 10 years there have been approximately four wildfire starts per year due to illegal activity. Illegal activity includes but is not limited to: abandoned campfires, use of fire or equipment (e.g. chainsaw) in a fire restriction zone and illegal drug activity (K Mayer 2008).

Alternative 3 would be the most limiting to legal motor vehicle access on the SNF. Implementation of this alternative is not likely to result in a statistically significant change the risk of wildfire starts due to the use of motor vehicles, as so few wildfires are attributable to motor vehicle use off existing designated roads and trails. Alternative 5 would allow the most legal motor vehicle access to the SNF and, again, it is not likely there would be any statistically significant change in the number of wildfire ignitions due

to motor vehicle use as compared to the current condition where cross-country motorized use is allowed in most places on the forest.

It is unlikely that any of the alternatives would change the public safety risk of wildfires due to illegal drug activity because it is well documented that these activities will use roads/trails/routes and cross-county access without regard to whether the form of access is designated or not. The law enforcement practice to discover and investigate these sites is to use helicopter surveillance and on foot. Therefore there is no difference between the alternatives for this concern.

Summary of Socio-Economic Effects

Alternative 1 – No Action

Direct, Indirect and Cumulative Effects

This alternative would result in no change to motorized recreation opportunities (including access to dispersed camping). Motorized freedom would have few limitations, resulting in conflict with non motorized users and private land. Natural resource impacts at many locations would not be acceptable. Route proliferation, impacts to private land and inability to enforce/restrict inappropriate use is likely to continue and increase over time. There are no current travel management conditions (forest orders, etc) that would adversely affect the diversity of visitors to the SNF; all conditions affect forest users equally. This alternative would not result in changes to the SNF region economies as measured by visitor expenditures, employment, and labor income. The Forest Service would remain responsible for maintaining existing motorized trails; however, the Forest Service would not be responsible for maintaining unauthorized routes developed because there would be no prohibition on motorized cross-country travel. While maintenance on unauthorized routes would not occur, actions to prevent further resource damage would be costly. This alternative does not comply with the Travel Management Rule.

When Alternative 1 is added to the other past, present and reasonably foreseeable activities on the SNF (Appendix E), the cumulative local social and economic effects are mixed and are not quantifiable. However, it is clear from the broader perspective of the Mission of the Forest Service that the cumulative effects of Alternative 1 would not be in compliance with the laws, regulations and policies the Forest Service is obliged to uphold.

Alternatives 2, 4, and 5

Direct, Indirect and Cumulative Effects

Alternatives 2, 4, and 5 are likely to have short-term effects on local users. In the short term, until the public becomes familiar with the use of the MVUM, there may be confusion regarding allowed and prohibited use in some areas. The Forest Service estimates that under Alternatives 2, 4, and 5, the amount of motorized use (including access to dispersed camping) would be relatively static over time, as the amount of high quality motorized recreation opportunities would increase as compared to Alternative 1. For example: there would be more effective trail maintenance and signing; and there would be more mixed use and combined use roads providing for longer loop connections, etc. However, in Alternatives 2, 4, and 5 use patterns may change and the same amount of motorized use may become more concentrated on designated roads, trails and areas. Alternative 5 would designate more mixed or combined use roads resulting in increased ability to disperse motorized use over larger areas (e.g. connecting the proposed motorized trails in the Gags AU with those in the Globe AU) would allow for less concentration.

If motorized recreation use were to increase, at some point some motorized recreationists may seek other areas to recreate off the SNF. The point at which this would occur is speculative. It is likely that public identification and management of a motorized trail and road system that previously was not designated for this use, coupled with publication of the Motor Vehicle Use Map (MVUM), visitor use maps, web site information, and possibly GPS coordinates for public use, would likely result in attracting more non-local visitors.

There are no proposed actions in Alternatives 2, 4, and 5 that would adversely affect the diversity of visitors to the SNF; all actions would affect forest users equally. Also, because motorized recreation is a small percentage (3 percent) of the overall visitation to the SNF, these alternatives are not expected to result in quantifiable changes to the SNF region economies as measured by visitor expenditures, employment and labor income. The Forest Service would be responsible for maintaining the newly designated trails and areas, providing a safer and more environmentally compatible motorized trail system. Maintenance for the newly designated additions to the motorized trail system would be taken into account in the appropriated budget and would qualify for green sticker grant funds. These alternatives would comply with the Travel Management Rule.

When Alternatives 2, 4 and 5 are added to the other past, present and reasonably foreseeable activities on the SNF (Appendix E), the cumulative local social and economic effects are mixed and are not quantifiable. However, it is clear from the broader perspective of the Mission of the Forest Service that the cumulative effects of Alternatives 2, 4, and 5 would be in compliance with the laws, regulations and policies the Forest Service is obliged to uphold.

Alternative 3

Direct, Indirect and Cumulative Effects

This alternative does not allow motorized recreation on any additional miles of motorized trail or motorized open areas. The Forest Service believes that under Alternative 3, levels of motorized use (including dispersed camping opportunities not accessed by the NFTS) would likely decrease but not be eliminated because a range of motorized opportunities would remain available with the NFTS. There are no proposed actions in Alternative 3 that would adversely affect the diversity of visitors to the SNF; all actions would affect forest users equally. Also, because motorized recreation is a small percentage (3 percent) of the overall visitation to the SNF, this alternative is not expected to result in quantifiable changes to the SNF region economies as measured by visitor expenditures, employment and labor income. The Forest Service would remain responsible for maintaining existing motorized trails.

When Alternative 3 is added to the other past, present and reasonably foreseeable activities on the SNF (Appendix E), the cumulative local social and economic effects are mixed and are not quantifiable. However, it is clear from the broader perspective of the Mission of the Forest Service that the cumulative effects of Alternatives 2, 4, and 5 would be in compliance with the laws, regulations and policies the Forest Service is obliged to uphold.

3.4.4 Compliance with the LRMP, Travel Management Rule and Other Direction

Alternatives 2-5 proposed in this FEIS are consistent with the LRMP and the Travel Management Rule.

Civil Rights and Environmental Justice

Civil Rights

The Forest Service manual defines civil rights as “the legal rights of United States citizens to guaranteed equal protection under the law (USDA-FS Manual 1730).” The Forest Service is committed to equal treatment of all individuals and social groups in its management programs in providing services, opportunities and jobs.

There is no evidence that any of the alternatives would result in actual or projected violations of legal rights to equal protection under the law is foreseen for any individual or category of people.

Environmental Justice

A specific consideration of equity and fairness in resource decision-making is encompassed with the concerns of environmental justice. As required, by Executive Order 12898, all Federal actions must consider potentially disproportionate effects on minority or low-income communities. Principles for considering environmental justice are outlined in Environmental Justice Guidance under the National Environmental Policy Act (Council on Environmental Quality 1997). Those principles were considered in this analysis. The Population and Demographics, Employment and Income and American Indian Rights and Interests portions of this chapter considered the demographics of the SNF Region.

There is no evidence to believe that minority or low-income groups will be adversely or disproportionately affected by the alternatives that have been presented in this document.

3.5 Visual Resources

3.5.1 Introduction

This section of the EIS examines the extent to which alternatives respond to visual resources management direction established in the 1991 LRMP and the Travel Management Rule. The LRMP visual resources direction was established under the implementing regulations of the National Forest Management Act (NFMA).

In the development of the LRMP, the SNF visual resources were inventoried to determine the landscape scenic attractiveness (Variety Class inventory) and the public's visual expectations (Sensitivity Level inventory). Based upon these inventories, Visual Quality Objectives (VQOs) were established for all National Forest System land areas. The VQOs establish minimum acceptable thresholds for landscape alterations from an otherwise natural-appearing forest landscape. Agriculture Handbook Number 462 (USDA-FS 1974) provides a description of the VQOs used for the visual management of lands administered by the SNF:

(P) Preservation VQO — Allows only for ecological changes. Management activities, except for very low visual impact recreation facilities, are prohibited. This objective applies to Congressionally-designated wilderness areas.

(R) Retention VQO — Provides for management activities which are not visually evident. Activities may only repeat form, line, color and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc. should not be evident.

(PR) Partial Retention VQO — Provides for management activities that remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color and texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc. remain visually subordinate to the characteristic landscape. Activities may also introduce form, line, color or texture which are found infrequently or not at all in the characteristic landscape, but still remain subordinate to the visual strength of the characteristic landscape.

(M) Modification VQO — Management activities may visually dominate the characteristic landscape. Activities of vegetative and land form alteration must borrow from naturally established form, line, color and texture so completely and at such scale that its visual characteristics are compatible with the natural surroundings.

Of the four VQOs mentioned above, only Retention and Partial Retention VQOs will be addressed in this visual resources analysis because landscapes assigned these two VQOs retain a natural or near natural appearance. Also, according to the SNF Visual Quality Element Map that shows the SNF VQOs, the landscapes with these two VQOs tend to be the most attractive or highly valued by the public outside wilderness areas.

Analysis Framework: Statute, Regulation, LRMP and Other Direction

Direction relevant to the proposed action as it affects visual resources includes:

National Forest Management Act (NFMA) – The NFMA and its implementing regulations required the inventory and evaluation of the forest visual resource, addressing the landscape's visual attractiveness and the public's visual expectations. Management prescriptions for definitive lands areas of the forest are to include VQOs.

Travel Management Rule – The Travel Management Rule does not cite aesthetics (visual resources) specifically, but in the designation of roads, motorized trails or areas, the responsible official shall consider effects on forest resources, with the objective of minimizing effects of motor vehicle use.

LRMP – The LRMP contains forest wide management direction in the form of VQOs and specific management area direction for visual resources. The visual resources management direction in the LRMP applicable to Retention and Partial Retention VQOs and to Motorized Travel Management is listed below:

- Pg 4-13, Section 4.5.2.2 Visual Resources, #25: Meet VQOs for all forest land, managing for Visual Condition Types II and III along designated recreational travel routes and around destination recreational areas (See Visual Quality Element Map). Based on the Visual Quality Element Map, Visual Condition Type II corresponds with Retention VQO and Visual Condition Type III corresponds with Partial Retention VQO.
- Pg 4-13, Section 4.5.2.2 Visual Resources, #26: Where VQOs are Type II Visual Conditions (Retention VQO):
 - (d) Design and install structures to be compatible with and subordinate to the landscape’s natural characteristics.
 - (e) Roads are to be designed and constructed to be subordinate to the landscape’s natural characteristics, after completion, as viewed from off site.
- Pgs 4-13 and 4-14, Section 4.5.2.2 Visual Resources, #27: Where VQOs are Type III Visual Conditions (Partial Retention VQO):
 - (e) Design and install structures to be compatible with and subordinate to the landscape’s natural characteristics.
 - (f) Roads are to be designed and constructed to be subordinate, after completion, to the landscape’s natural characteristics, as viewed from offsite.

Effects Analysis Methodology

This Effects Analysis Methodology section describes the methodology used for addressing the direct and indirect effects of each of the four actions and the cumulative effects of implementing each alternative as a whole. It addresses the spatial boundary of the effects analysis, timeframes (short-term and long-term), visual resource indicators to be measured, including justification as to why they were chosen, impacts relevant to visual resources, visual resource-specific assumptions and sources of data used to support the analysis.

General Guidelines for Effects Analysis for Visual Resources

1. **Spatial Boundary:** The “key viewshed” is the unit of spatial analysis when considering effects on visual resources. See Table 3- 31 for key viewsheds relevant to this analysis.
2. **Effects Timeframes:**
 - Short-term effects occur within 1 year.
 - Long-term effects occur up to 20 years.
 - Cumulative effects should be analyzed at a 20-year interval.

3. **Visual Resources Measurement Indicators and Rationale.** The measurement indicators are intended to address how each action individually (direct /indirect effects) and each alternative as the sum total of its proposed actions (cumulative effects in the context of other past, present and reasonably foreseeable actions) respond to the LRMP and the Travel Management Rule: whether the motorized recreation opportunity affects the natural appearance of the forest landscapes.
 - **Measurement Indicator 1: Retention and Partial Retention Visual Quality Objectives (VQOs) landscapes.** For each alternative determine the extent to which the existing unauthorized routes and areas in relation to continued cross-country motor vehicle travel or the proposed NFTS additions (roads, motorized trails, areas) (as applicable) fall within sparsely canopy covered landscapes assigned the Retention and Partial Retention VQOs (number of miles or acres in landscapes that are to remain natural to near-natural appearing in character). Forested landscapes with a dense canopy cover have the capability of masking landscape alterations; sparsely canopy covered landscapes have less capability.
 - **Measurement Indicator 2: Key viewsheds.** For each alternative determine the number of key viewsheds that are or have the potential to be affected by motor vehicle travel (the extent to which the existing unauthorized routes and areas in relation to continued cross-country motor vehicle travel or the proposed NFTS additions (as applicable) within sparsely canopy covered landscapes assigned the Retention and Partial Retention VQOs are visible from key viewsheds). The designated recreational travel routes and destination recreational areas identified in the LRMP and in the LRMP-FEIS are defined as key viewsheds for the purpose of this analysis (see Table 3- 31).

Impacts Relevant to Visual Resources Include:

1. Non-characteristic line quality created by road or trail segments is the greatest impact to visual resources; the location and design of these segments can significantly reduce their visual impact.
2. Uncharacteristic changes in the natural landscape as measured in form, line, color and texture.
3. The proliferation of unauthorized routes and unauthorized areas, particularly in sparsely canopy covered landscapes, can adversely affect the visual resources.

Assumptions Specific to Visual Resources Analysis

1. Based upon the review of the LRMP, the basic measurement indicator for the visual resources should be 'Compliance with the Retention and Partial Retention VQOs.'
2. The Preservation VQO is not addressed in this analysis since this VQO occurs only in Congressionally-designated wilderness and special classified areas. Motorized access is not authorized in these areas.
3. The Modification VQO is not addressed in this analysis since this VQO allows for areas to have alterations, such as roads and trails that may visually dominate the characteristic landscape and not appear natural.
4. Only the designated recreational travel routes and destination recreational areas identified in the LRMP and in the LRMP-FEIS will be used as key viewsheds.

5. The prohibition of cross-country motor vehicle travel and the closure of roads should have a beneficial effect on the visual resources. This assumes that nature will take its course and revegetate disturbances.
6. For classification, analysis and inventory of the visual resource landscape viewing is identified by the distance zones of immediate foreground (0 feet to 300 feet), foreground (300 feet to 1/2 mile) and middleground (1/2 mile to 4 miles).
7. The SNF VQOs were established using the Visual Management System (VMS). The VMS was superseded by the Scenery Management System (SMS) in 1995 (USDA-FS 1995). The SNF has not yet converted to SMS and continues to use the VQOs. For this reason, the terminology and processes of the VMS, including the VQOs, will be used in this analysis instead of the SMS.
8. Landscapes with dense canopy cover have a high capability of masking linear ground-based alterations such as roads and trails.
9. The proposed NFTS additions (roads and motorized trails) are analyzed collectively because both create predominantly linear alterations in landscapes. The proposed NFTS additions (areas) are analyzed separately from the proposed NFTS additions (roads and motorized trails) because they create alterations in landscapes as measured in form, color and texture.
10. All vehicle class types (both greater than and less than 50") result in the same amount of disturbance effects to visual resources.

Data Sources

1. The LRMP and LRMP FEIS were used for visual resources management direction and identification of key viewsheds.
2. SNF National Visitor Use Monitoring (NVUM) reports (USDA-FS 2003 and 2008) were used to determine the popularity of viewing scenery or driving for pleasure.
3. SNF Geographic Information System (GIS) corporate database using ESRI ArcMap Version 9.2 GIS software was used for effect analysis of the proposed NFTS additions in relation to VQOs, vegetation type and key viewsheds.

Visual Resources Methodology by Action

The analysis methodologies for each of the four actions that make up the alternatives and cumulative effects of the actions are described below.

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

In order to identify the direct and indirect effects of the prohibition of cross-country motor vehicle travel, the following methodology is conducted to show the effects of continued cross-country motor vehicle travel; which applies only to Alternative 1. Understanding the effects of continued cross-country motor vehicle travel in Alternative 1 would assist in understanding the effects of the prohibition of cross-country motor vehicle travel.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial Boundary: The "key viewshed" is the unit of spatial analysis when considering effects associated with changes in the NFTS, prohibition of cross-country motor vehicle travel, or season of use. See Table 3- 31 for key viewsheds relevant to this analysis.

Indicator 1: Retention and Partial Retention Visual Quality Objectives (VQOs) landscapes. Determine the extent to which the existing unauthorized routes and areas in relation to continued cross-country motor vehicle travel from Alternative 1 fall within sparsely canopy covered landscapes assigned the Retention and Partial Retention VQOs (number of miles or acres in landscapes that are to remain natural to near-natural appearing in character).

Methodology: GIS analysis of the existing unauthorized routes and areas in relation to Retention and Partial Retention VQOs and vegetation type (overlay the unauthorized routes and areas from Alternative 1 shapefile with the forest VQOs of Retention and Partial Retention and the forest vegetation layer).

Indicator 2: Key viewsheds. Determine the number of key viewsheds that are or have the potential to be affected by motor vehicle travel (the extent to which the existing unauthorized routes and areas within sparsely canopy covered landscapes assigned the Retention and Partial Retention VQOs are visible from key viewsheds).

Methodology: Identify key forest viewsheds mentioned in the LRMP and LRMP-FEIS (designated recreational travel routes and destination recreational areas) and complete a viewshed analysis to portray which existing unauthorized routes or areas are visible from each of the key viewsheds and which cannot be viewed. Each viewshed takes into account a viewpoint, topography, direction of sight and distance of sight (EarthSLOT 2008). Along with the viewshed analysis, vegetation type is analyzed and site visits are conducted to identify whether any of these key viewsheds are or have the potential to be affected by motor vehicle travel.

Rationale: Compliance with the Retention and Partial Retention VQOs

2. Direct and indirect effects of adding facilities (presently unauthorized roads, trails and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

The proposed NFTS additions and their potentially associated landscape alterations as measured in form, line, color and texture may be visible from key viewsheds affecting visual resources in landscapes with Retention and Partial Retention VQOs. The dust and the physical presence of motor vehicles may also impact visual resources from key viewsheds. These effects can be both short- and long-term.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial Boundary: The “key viewshed” is the unit of spatial analysis when considering effects associated with changes in the NFTS or season of use. See Table 3- 31 for key viewsheds relevant to this analysis.

Indicator 1: Retention and Partial Retention Visual Quality Objectives (VQOs) landscapes. The extent to which the proposed NFTS additions (roads, motorized trails, areas) fall within sparsely canopy covered landscapes assigned the Retention and Partial Retention VQOs (number of miles or acres in landscapes that are to remain natural to near-natural appearing in character).

Methodology: GIS analysis of proposed NFTS additions in relation to Retention and Partial Retention VQOs and vegetation type (overlay the proposed NFTS additions with the forest VQOs of Retention and Partial Retention and the forest vegetation layer).

Indicator 2: Key Viewsheds. Number of key viewsheds that are or have the potential to be affected by motor vehicle travel (the extent to which the proposed NFTS additions

within sparsely canopy covered landscapes assigned the Retention and Partial Retention VQOs are visible from key viewsheds).

Methodology: Identify key forest viewsheds mentioned in the LRMP and LRMP-FEIS (designated recreational travel routes and destination recreational areas) and complete a viewshed analysis to portray which proposed NFTS additions are visible from each of the key viewsheds and which NFTS additions cannot be viewed. Each viewshed takes into account a viewpoint, topography, direction of sight and distance of sight (EarthSLOT 2008). Along with the viewshed analysis, vegetation type is analyzed and site visits are conducted to identify whether any of these key viewsheds are or have the potential to be affected by motor vehicle travel.

Rationale: Compliance with the Retention and Partial Retention VQOs.

3. Changes to the NFTS (changing vehicle class, season of use, and road closures)

Changes to the vehicle class and season of use would have no effect on visual resources. However, the proposed year-round road closures may have a beneficial effect on visual resources, particularly if road closures are within Retention and Partial Retention VQOs.

4. Non-Significant LRMP Amendments

As explained in section 3.1.1, the non-significant LRMP amendments do not have unique effects when compared to the other actions analyzed in this FEIS. Therefore, the environmental consequences have been analyzed and will not be discussed further in the visual resources section.

5. Cumulative Effects

The cumulative effects include the other past, present and reasonably foreseeable actions on the SNF that might contribute to the visual resources effects on key viewsheds and the extent to which the existing unauthorized routes and areas in relation to continued cross-country motor vehicle travel or the proposed NFTS additions (roads, motorized trails, areas) (as applicable) within sparsely canopy covered landscapes assigned the Retention and Partial Retention VQOs are visible from key viewsheds. The threshold for cumulative effects is exceeded when alterations visually dominate the landscape (e.g. uncharacteristic linear qualities in forest landscapes).

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial Boundary: The “key viewshed” is the unit of spatial analysis for determining cumulative effects. See Table 3- 31 for key viewsheds relevant to this analysis.

Indicator 2: Key Viewsheds. Number of key viewsheds that are or have the potential to be affected by motor vehicle travel (the extent to which the existing unauthorized routes and areas in relation to continued cross-country motor vehicle travel or the proposed NFTS additions (as applicable) within sparsely canopy covered landscapes assigned the Retention and Partial Retention VQOs are visible from key viewsheds).

Methodology: Identify key forest viewsheds mentioned in the LRMP and LRMP-FEIS (designated recreational travel routes and destination recreational areas) and complete a viewshed analysis to portray which existing unauthorized routes and areas or proposed NFTS additions are visible from each of the key viewsheds and which cannot be viewed. Each viewshed takes into account a viewpoint, topography, direction of sight and distance of sight (EarthSLOT 2008). Along with the viewshed analysis, vegetation type is

analyzed and site visits are conducted to identify whether any of these key viewsheds are or have the potential to be affected by motor vehicle travel and in the context of other past, present and reasonably foreseeable actions affecting visual resources. See Appendix E for a list of past, present and reasonably foreseeable future actions.

Rationale: Compliance with the Retention and Partial Retention VQOs.

3.5.2 Affected Environment and Environmental Consequences

The affected environment and environmental consequences sections pertain to the entire project area forestwide.

Affected Environment

The SNF exhibits diverse and distinctive landscape qualities highly suited to scenic appreciation (USDA-FS 1991a). The SNF NVUM report in 2003 determined that 31.9 percent of those who visited the forest participated in viewing natural features such as scenery, flowers, etc. and 13.2 percent participated in driving for pleasure on roads (NVUM 2003). The SNF 2008 NVUM report shows an increase in scenery appreciation with 51.3 percent of forest visitors participating in viewing natural features such as scenery (a 19.4 percent increase from 2003) and 13.6 percent participating in driving for pleasure (a 0.4 percent increase from 2003).

Few National Forests offer the range of scenic attractions found in the SNF. The forest landscape is quite diverse, ranging from steeply rolling chaparral and grass-woodland foothills to barren windswept crags on the Sierra Crest. The mid-elevations are characterized by steep-walled river canyons interspersed with gentler highly productive heavily forested areas. At the high elevations the knife-edged ridges, sharp peaks and steep-walled basins, frequently containing lakes, owe their form to the abrading action of glaciers. The steep-walled canyons and rolling topography of the lower elevations developed through water and wind erosion. Landscapes with the greatest variety of landforms, water features and vegetation are considered to be the most attractive (USDA-FS 1991).

Table 3- 30 summarizes the acres assigned each VQO on the SNF. Over 26 percent of the SNF landscapes are assigned Retention and Partial Retention VQOs (the Retention and Partial Retention VQOs have been bold-faced to reinforce that these are the VQOs used in this analysis).

Table 3- 30. VQO Summary

Visual Quality Objective	Acres	Percent
Preservation VQO	579,066	41%
Retention VQO	106,791	7%
Partial Retention VQO	264,255	19%
Modification VQO	467,996	33%

Table 3- 31 illustrates the designated recreational travel routes and destination recreational areas identified in the LRMP and in the LRMP-FEIS that are used as key viewsheds in this analysis. There are 22 key viewsheds.

Table 3- 31. Key Viewsheds in the SNF

Developed Recreational Areas
Bass Lake
Mammoth Pool
Huntington Lake
Florence/Edison Lakes
Shaver Lake
Courtright/Wishon Reservoirs
Pine Flat Reservoir
Dinkey Creek
Wild and Scenic Rivers
Merced, South Fork Merced (This recreational area includes State Highway 140)
Kings, South and Middle Fork Kings
State Highways and Major Forest Roads
State Highway 41
State Highway 168 (Sierra Heritage National Forest Scenic Byway)
State Highway 49
McKinley Grove Road
Scenic Byways
Sierra Vista National Forest Scenic Byway
Special Interest Areas
Courtright Intrusive Contact Zone Geological Area
Kings Cavern Geological Area
Carpenteria Botanical Area
Nelder Grove Historical Area
McKinley Grove Botanical Area
Dinkey Creek Roof Pendant Geological Area
Devils Peak Botanical Area

Environmental Consequences

Transportation facilities can create landscape alterations as measured in form, line, color and texture. These alterations can be reduced through good design. Unmitigated, they present uncharacteristic qualities in forest landscapes. Forested landscapes with a dense canopy cover have the capability of masking these alterations; sparsely canopy covered landscapes have less capability. The proliferation of unauthorized routes and unauthorized areas, particularly in sparsely canopy covered landscapes, can adversely affect visual resources.

The methodology for analyzing the direct, indirect and cumulative effects for the proposed NFTS additions (roads, motorized trails, areas) of each alternative is explained in further detail within the Figure 3- 7 below, using the Effects Analysis Methodology (including indicators) discussed above. The methodology for analyzing the direct, indirect, and cumulative effects for the existing unauthorized routes and areas in relation to continued cross-country motor vehicle is not addressed in the Figure 3- 7 below to simplify the context, but it is discussed above under the Visual Resources Methodology by Action section. However, based on its methodology, the data (i.e. miles and acres) for the existing unauthorized routes and areas for Alternative 1 is illustrated with a footnote in the same tables discussed in the Figure 3- 7 below. Site specific analyses were completed and are placed in the project record. The site specific analyses for landscapes assigned Retention and Partial Retention VQOs were completed at a level sufficient to identify any site specific mitigations, support the analysis of each alternative and discrete action and complete the effects analysis methodology.

Figure 3- 7. Method for Analyzing Direct, Indirect and Cumulative Effects for the Proposed NFTS Additions

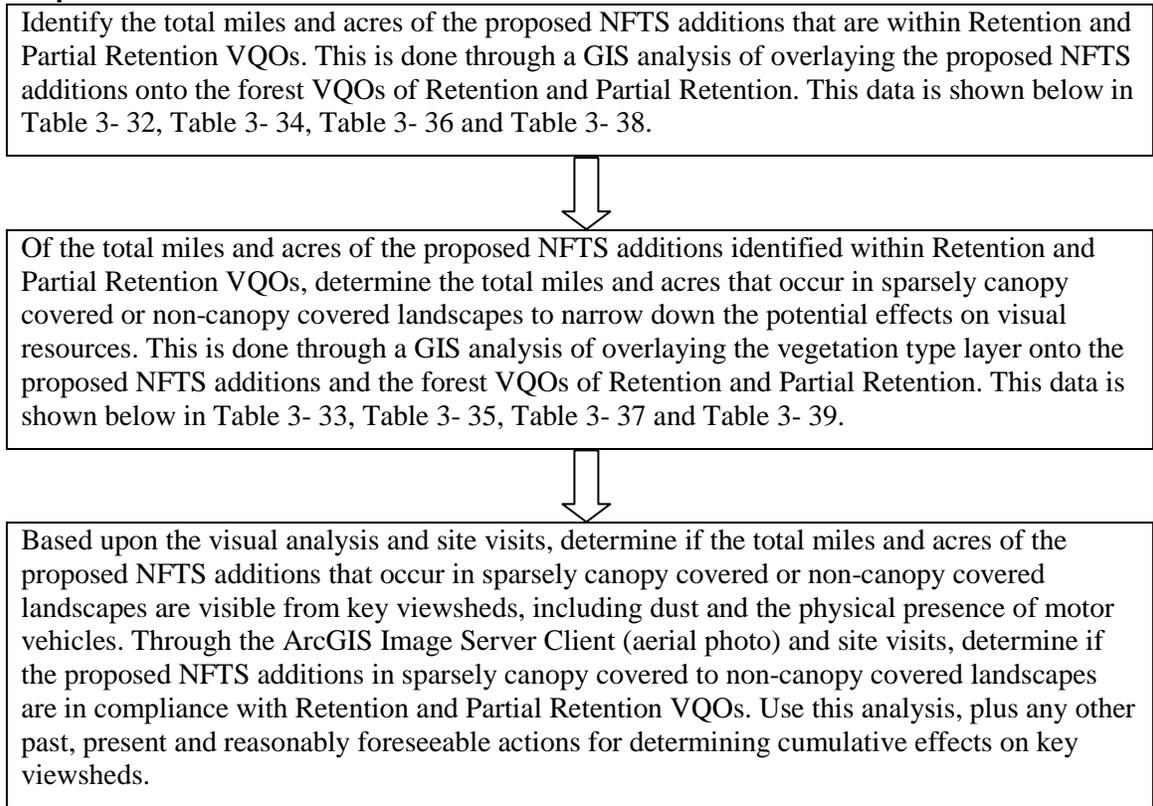


Table 3- 32. Summary of Miles for the Proposed NFTS Additions (Roads and Motorized Trails) within Retention VQO

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total miles Forestwide	79.65¹	3.30	0	4.54	7.20

Table 3- 33. Summary of Miles for the Proposed NFTS Additions (Roads and Motorized Trails) within Retention VQO that are in Sparsely Canopy Covered or Non-Canopy Covered Landscapes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total miles Forestwide	14.01¹	0.07	0	0.46	0.55

¹ In Alternative 1, there are no proposed additions to the NFTS. The data shows the miles and acres of the existing unauthorized routes and areas in relation to the continued cross-country motor vehicle travel in Alternative 1. The data is shown to explain the differences between the existing conditions in Alternative 1 and the proposed conditions in Alternatives 2 through 5 with prohibition of cross-country motor vehicle travel.

Table 3- 34. Summary of Miles for the Proposed NFTS Additions (Roads and Motorized Trails) within Partial Retention VQO

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total miles Forestwide	147.70 ²	18.51	0	13.49	24.63

Table 3- 35. Summary of Miles for the Proposed NFTS Additions (Roads and Motorized Trails) within Partial Retention VQO that are in Sparsely Canopy Covered or Non-Canopy Covered Landscapes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total miles Forestwide	24.44 ²	1.55	0	2.84	3.37

Table 3- 36. Summary of Acres for the Proposed NFTS Additions (Areas) within Retention VQO

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total acres Forestwide	128.27 ²	6.12	0	6.42	8.39

Table 3- 37. Summary of Acres for the Proposed NFTS Additions (Areas) within Retention VQO that are in Sparsely Canopy Covered or Non-Canopy Covered Landscapes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total acres Forestwide	26.06 ²	3.52	0	3.52	3.52

Table 3- 38. Summary of Acres for the Proposed NFTS Additions (Areas) within Partial Retention VQO

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total acres Forestwide	237.23 ²	0	0	0.63	7.04

Table 3- 39. Summary of Acres for the Proposed NFTS Additions (Areas) within Partial Retention VQO that are in Sparsely Canopy Covered or Non-Canopy Covered Landscapes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total acres Forestwide	118.43 ²	0	0	0	4.51

See the effects analysis methodology and the environmental consequences sections discussed above regarding how the effects of each alternative were determined.

² In Alternative 1, there are no proposed additions to the NFTS. The data shows the miles and acres of the existing unauthorized routes and areas in relation to the continued cross-country motor vehicle travel in Alternative 1. The data is shown to explain the differences between the existing conditions in Alternative 1 and the proposed conditions in Alternatives 2 through 5 with prohibition of cross-country motor vehicle travel.

Alternative 1 – No Action

Cross-country Motor Vehicle Travel

Direct Effects

Under the No Action Alternative, cross-country motor vehicle travel would continue except as currently prohibited by the SNF 1977 Off-Road Vehicle (ORV) Plan implemented by Forest Order 15-77-3 (see Figure 1-3 for a map of this area). The continued availability of unrestricted cross-country motor vehicle travel (generally below 6800') would create landscape alterations (i.e. uncharacteristic line quality) in natural-appearing forest landscapes that would affect visual resources from key viewsheds. Based on the effects analysis methodology and the data collected in Table 3- 32 through Table 3- 39 for Alternative 1, there are six key viewsheds that are affected by motor vehicle travel in relation to the continued cross-country motor vehicle travel in Alternative 1. The numbered statements below show the six key viewsheds that are currently affected by motor vehicle travel due to the absence of “walls” of trees or earth forms in the viewing distance zones of immediate foreground (0ft. to 300ft.) or foreground (300ft. to 1/2 mile).

1. Bass Lake
2. Mammoth Pool
3. Florence/Edison Lakes
4. Pine Flat Reservoir
5. Merced, South Fork Merced Wild and Scenic River
6. Sierra Vista National Forest Scenic Byway

The list of Key Viewsheds in the SNF shown in Table 3- 31 above is reintroduced below in Table 3- 40 to show the six key viewsheds currently affected by motor vehicle travel in relation to all 22 key viewsheds in the SNF. The six key viewsheds have been bold-faced to reinforce that these are the key viewsheds currently affected by motor vehicle travel in Alternative 1.

Table 3- 40. List of Six Key Viewsheds Currently Affected by Motor Vehicle Travel

Developed Recreational Areas
Bass Lake
Mammoth Pool
Huntington Lake
Florence/Edison Lakes
Shaver Lake
Courtright/Wishon Reservoirs
Pine Flat Reservoir
Dinkey Creek
Wild and Scenic Rivers
Merced, South Fork Merced (This recreational area includes State Highway 140)
Kings, South and Middle Fork Kings
State Highways and Major Forest Roads
State Highway 41
State Highway 168 (Sierra Heritage National Forest Scenic Byway)
State Highway 49
McKinley Grove Road

Scenic Byways
Sierra Vista National Forest Scenic Byway
Special Interest Areas
Courtright Intrusive Contact Zone Geological Area
Kings Cavern Geological Area
Carpenteria Botanical Area
Nelder Grove Historical Area
McKinley Grove Botanical Area
Dinkey Creek Roof Pendant Geological Area
Devils Peak Botanical Area

Indirect Effects

All 22 key viewsheds have the potential to be affected by motor vehicle travel. Due to the continued cross-country motor vehicle travel, there may be an increase of unauthorized routes and unauthorized areas. The proliferation of unauthorized routes and areas may occur in sparsely canopy covered landscapes within Retention and Partial Retention VQOs and within any of the key viewsheds. As a result, the unauthorized routes and areas may be visible from all 22 key viewsheds due to the absence of “walls” of trees or earth forms in the viewing distance zones of immediate foreground (0ft. to 300ft.) or foreground (300ft. to 1/2 mile); reducing the scenic character of the forest.

Additions to the NFTS

Direct Effects

No new facilities would be added to the NFTS resulting in no change in effect for visual resources.

Indirect Effects

No change in effect for visual resources.

Changes to the NFTS (changing vehicle class, season of use, and road closures)

Direct Effects

No changes would be made to the NFTS resulting in no change in effect for visual resources.

Indirect Effects

No change in effect for visual resources.

Cumulative Effects

There are six key viewsheds that are affected by motor vehicle travel due to the existing conditions of continued cross-country motor vehicle travel in Alternative 1. However, all 22 key viewsheds may potentially have negative effects on visual resources due to the continued proliferation of cross-country motor vehicle travel. The visual resources effects would be long-term; the continued proliferation and concentration of unauthorized route segments and unauthorized areas would create uncharacteristic qualities in forest landscapes as measured in form, line, color and texture. The proliferation of unauthorized routes and unauthorized areas may

occur in sparsely canopy covered landscapes within Retention and Partial Retention VQOs and within any of the key viewsheds. As a result, the unauthorized routes and areas may be visible from key viewsheds due to the absence of “walls” of trees or earth forms in the viewing distance zones of immediate foreground (0ft. to 300ft.) or foreground (300ft. to 1/2 mile). The unauthorized routes and unauthorized areas would not be in compliance with Retention and Partial Retention VQOs. When added to the other past, present and reasonably foreseeable activities on the SNF, Alternative 1 would have the greatest potential for exceeding the cumulative effects threshold and causing visual resources effects in key viewsheds. The threshold for cumulative effects is exceeded when alterations visually dominate the landscape (e.g. uncharacteristic linear qualities in forest landscapes).

Past activities have altered the natural landscape, creating the existing condition of the landscape. The most obvious and significant effects on visual resources are from landform alterations, constructed facilities and vegetation manipulation. The activities that have contributed include: utilities, fire management (suppression, prescribed burning, fuel breaks/reduction), timber management, recreational facility development and others. Many of the impacts from these past activities have either been naturally revegetated or are hidden presently by the forested landscape. Recreation facilities and utility lines are the most obvious effects on visual resources in the immediate foreground (0 ft to 300 ft) and foreground (300 ft to 1/2mile). Beyond the foreground, these constructed facilities and utilities are hidden in the forested landscape. Present activities on the SNF, for the most part, are not visible from key viewsheds, except in some occasions, the smoke and burned areas caused from prescribed burning. The smoke is a temporary effect and the burned areas will naturally revegetate with low grasses usually within a year. Current recreation projects mostly consist of rehabilitation of current facilities to update them to current design and universal accessibility standards. Reasonably foreseeable activities on the forest include: fuels management, grazing management, minerals and geology, non-recreation special uses, recreation management and road management. These future activities shall comply with the VQOs and applicable visual resources management direction specified in the LRMP to minimize effects on visual resources. The past, present and future activities on the SNF have no cumulative effects on visual resources from key viewsheds.

Alternative 3

Cross-country Motor Vehicle Travel

Direct Effects

The prohibition of cross-country motor vehicle travel would have a beneficial effect on the forest visual resources because there are no key viewsheds being affected by continued cross-country motor vehicle travel. The prohibition of cross-country motor vehicle travel would remove the chance of continued proliferation of unauthorized routes and unauthorized areas which have the potential to reduce the scenic character of the forest. Unauthorized routes and unauthorized areas that are not added to the NFTS would result in natural revegetation and an associated enhancement of the visual resource. Improvement of the visual resources is long-term; unauthorized routes and unauthorized areas would gradually revegetate over time.

Indirect Effects

The prohibition of cross-country motor vehicle travel would enhance the natural-appearing forest landscape increasing visual quality, particularly in landscapes with Retention and Partial Retention VQOs. However, the prohibition of cross-country motor vehicle travel would prevent enjoyment of visual resources for those using motor vehicles at many locations, primarily from

the unauthorized routes. There are no new facilities (roads, motorized trails, areas) proposed for addition to the NFTS compensating for those facilities being removed due to the prohibition of cross-country motor vehicle travel.

Additions to the NFTS

Direct Effects

Under Alternative 3, no new facilities are proposed for addition to the NFTS resulting in no change in effect for visual resources. None of the currently unauthorized routes and unauthorized areas would be added to the NFTS under this Alternative.

Indirect Effects

No change in effect for visual resources.

Changes to the NFTS (changing vehicle class, season of use, and road closures)

Direct Effects

No changes would be made to the NFTS resulting in no change in effect for visual resources.

Indirect Effects

No change in effect for visual resources.

Cumulative Effects

When actions in Alternative 3 are added to the other past, present and reasonably foreseeable activities on the SNF (as described in the cumulative effects section under Alternative 1), there are no cumulative effects on visual resources from key viewsheds because this alternative has beneficial effects on visual resources and therefore cannot contribute to adverse cumulative effects.

Common to Alternative 2, Alternative 4 and Alternative 5

Cross-country Motor Vehicle Travel

Direct Effects

With the selection of any of these alternatives (Alternatives 2, 4 or 5), cross-country motor vehicle travel will be prohibited forestwide. The prohibition of cross-country motor vehicle travel would have a beneficial effect on the forest visual resources because there are no key viewsheds being affected by continued cross-country motor vehicle travel. The prohibition of cross-country motor vehicle travel would remove the chance of continued proliferation of unauthorized routes and unauthorized areas which have the potential to reduce the scenic character of the forest. Unauthorized routes and unauthorized areas that are not added to the NFTS would result in natural revegetation and an associated enhancement of the visual resource. Improvement of the visual resources is long term; unauthorized routes and unauthorized areas would gradually revegetate over time.

Indirect Effects

The prohibition of cross-country motor vehicle travel would enhance the natural-appearing forest landscape increasing visual quality, particularly in landscapes with Retention and Partial Retention VQOs. In these alternatives, the enjoyment of visual resources would not be prevented for those using motor vehicles at many locations because the NFTS additions (roads, motorized trails, areas) being proposed would compensate for those facilities being removed due to the prohibition of cross-country motor vehicle travel.

Additions to the NFTS

Direct and Indirect Effects

The addition of facilities to the NFTS have no negative effects on visual resources because the proposed NFTS additions (roads, motorized trails, areas) within sparsely canopy covered landscapes are in compliance with Retention and Partial Retention VQOs and are not visible from key viewsheds, including dust and the physical presence of motor vehicles because of the reasons listed below:

- “Walls” of trees or earth forms (hillsides, rock cliffs, rolling hills) enframe the views on the sides of travel routes directing the viewer’s attention inwards and screening views beyond the immediate foreground (0 ft to 300 ft).
- Views from recreational areas are enclosed by “walls” of trees or earth forms (hillsides, rock cliffs, rolling hills) screening views beyond the immediate foreground (0 ft to 300 ft) or foreground (300 ft to 1/2 mile).
- The proposed NFTS additions are outside the viewshed of immediate foreground (0 ft to 300 ft), foreground (300 ft to 1/2 mile) and middleground (1/2 mile to 4 miles).

The following detailed data is based on the effects analysis methodology in Figure 3-7 and the data collected on Table 3- 32 to Table 3- 39 for Alternatives 2, 4, and 5.

Proposed NFTS Additions (Roads and Motorized Trails) within Retention VQO and within Sparsely Canopy Covered or Non-Canopy Covered Landscapes (Table 3- 32 and Table 3- 33)

The proposed NFTS additions (roads and motorized trails) within Retention VQO have no visual resources effects from key viewsheds. There were 3.30 miles in Alternatives 2, 4.54 miles in Alternative 4 and 7.20 miles in Alternative 5 of roads and motorized trails proposed for addition to the NFTS identified within Retention VQO. Of the 3.30 miles (Alternative 2), only 0.07 miles of the proposed roads and motorized trails were identified in sparsely canopy covered or non-canopy covered landscapes. Of the 4.54 miles (Alternative 4), only 0.46 miles of the proposed roads and motorized trails were identified in sparsely canopy covered or non-canopy covered landscapes. Of the 7.20 miles (Alternative 5), only 0.55 miles of the proposed roads and motorized trails were identified in sparsely canopy covered or non-canopy covered landscapes. Based upon the viewshed analysis and site visits, the .07 miles in Alternative 2, 0.46 miles in Alternative 4 and 0.55 miles in Alternative 5 are not visible from key viewsheds, including dust and the physical presence of motor vehicles because of the reasons listed above in the bullet statements at the beginning of the Direct and Indirect Effects section.

Based upon the use of the ArcGIS Image Server (aerial photo) and site visits, the proposed roads and motorized trails are not visually evident in the landscape resulting in compliance with the Retention VQO.

Proposed NFTS Additions (Roads and Motorized Trails) within Partial Retention VQO and within Sparsely Canopy Covered or Non-Canopy Covered Landscapes (Table 3- 34 and Table 3- 35)

The proposed NFTS additions (roads and motorized trails) within Partial Retention VQO have no visual resources effects from key viewsheds. There were 18.51 miles in Alternative 2, 13.49 miles in Alternative 4 and 24.63 miles in Alternative 5 of roads and motorized trails proposed for addition to the NFTS identified within Partial Retention VQO. Of the 18.51 miles (Alternative 2), only 1.55 miles of the proposed roads and motorized trails were identified in sparsely canopy covered or non-canopy covered landscapes. Of the 13.49 miles (Alternative 4), only 2.84 miles of the proposed roads and motorized trails were identified in sparsely canopy covered or non-canopy covered landscapes. Of the 24.63 miles (Alternative 5), only 3.37 miles of the proposed roads and motorized trails were identified in sparsely canopy covered or non-canopy covered landscapes. Based upon the viewshed analysis and site visits, the 1.55 miles in Alternative 2, 2.84 miles in Alternative 4 and 3.37 miles in Alternative 5 are not visible from key viewsheds, including dust and the physical presence of motor vehicles because of the reasons listed above in the bullet statements at the beginning of the Direct and Indirect Effects section.

Based upon the use of the ArcGIS Image Server (aerial photo) and site visits, the proposed roads and motorized trails remain visually subordinate to the landscape resulting in compliance with the Partial Retention VQO.

Proposed NFTS Additions (Areas) within Retention VQO and within Sparsely Canopy Covered or Non-Canopy Covered Landscapes (Table 3- 36 and Table 3- 37)

The proposed NFTS additions (areas) within Retention VQO have no visual resources effects from key viewsheds. There were 6.12 acres in Alternative 2, 6.42 acres in Alternative 4 and 8.39 acres in Alternative 5 of proposed areas identified within Retention VQO. Of the 6.12 acres (Alternative 2), 6.42 acres (Alternative 4) and 8.39 acres (Alternative 5), only 3.52 acres of the proposed areas were identified in sparsely canopy covered or non-canopy covered landscapes. Based upon the viewshed analysis and site visits, the 3.52 acres are not visible from key viewsheds, including dust and the physical presence of motor vehicles because of the reasons listed above in the bullet statements at the beginning of the Direct and Indirect Effects section.

Based upon the use of the ArcGIS Image Server (aerial photo) and site visits, the proposed areas are not visually evident in the landscape resulting in compliance with the Retention VQO.

Proposed NFTS Additions (Areas) within Partial Retention VQO and within Sparsely Canopy Covered or Non-Canopy Covered Landscapes (Table 3- 38 and Table 3- 39)

The proposed NFTS additions (areas) within Partial Retention VQO have no visual resources effects from key viewsheds. There were 0.0 acres in Alternative 2, 0.63 acres in Alternative 4 and 7.04 acres in Alternative 5 of proposed areas identified within Partial Retention VQO. Of the 0.63 acres (Alternative 4), no acres were identified in sparsely canopy covered or non-canopy covered landscapes. Of the 7.04 acres (Alternative 5), only 4.51 acres of the proposed areas were identified in sparsely canopy covered or non-canopy covered landscapes. Based upon the viewshed analysis and site visits, the 4.51 acres are not visible from key viewsheds, including dust and the physical presence of motor vehicles because of the reasons listed above in the bullet statements at the beginning of the Direct and Indirect Effects section.

Based upon the use of the ArcGIS Image Server (aerial photo) and site visits, the proposed areas remain visually subordinate to the landscape resulting in compliance with the Partial Retention VQO.

The pictures below were taken on December 5th and 6th, 2008 by Sierra National Forest Landscape Architect Cesar Sanchez.

Figure 3- 8 and Figure 3- 9 show examples of how “walls” of trees or earth forms (hillsides, rock cliffs, rolling hills) enframe the views on the sides of travel routes directing the viewer’s attention inwards and screening views beyond the immediate foreground (0 ft to 300 ft).

Figure 3- 8. Views from McKinley Grove Road



“Walls” of trees on the sides of the road screen views beyond the immediate foreground

Figure 3- 9. Views from State Highway 41



Hillsides and “walls” of trees serve as the forces of enframement along the Highway

Figure 3- 10 and Figure 3- 11 show examples of how views from recreational areas are enclosed by “walls” of trees or earth forms (hillsides, rock cliffs, rolling hills) screening views beyond the immediate foreground (0 ft to 300 ft) or foreground (300 ft to 1/2 mile).

Figure 3- 10. Views from Dinkey Creek



“Walls” of trees and rock outcrops dominate the views in the immediate foreground

Figure 3- 11. Views from Shaver Lake



Rolling hills and “walls” of trees surround the lake

Changes to the NFTS (changing vehicle class, season of use, and road closures)

Direct Effects

Changes to the NFTS related to vehicle class and season of use would have no effect on visual resources. However, the proposed year-round road closures identified under these Alternatives would have a beneficial effect on visual resources, particularly if the road closures are within Retention and Partial Retention VQOs. The roads that are closed would still be retained as a facility in case they are needed for future management activities. However, the roads would require less maintenance allowing for potential natural revegetation of low grasses and low bushes to occur.

Indirect Effects

No change in effect for visual resources.

Cumulative Effects

When actions in Alternatives 2, 4 and 5 are added to the other past, present and reasonably foreseeable activities on the SNF (as described in the cumulative effects section under Alternative 1), there are no cumulative effects on visual resources from key viewsheds because these alternatives have beneficial effects on visual resources and therefore do not contribute to adverse cumulative effects.

Summary of Effects Analysis across All Alternatives

Table 3- 41 displays a comparison of all five alternatives, by environmental effects.

Table 3- 41. Summary of Effects by Alternative

Indicator	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Number of key viewsheds that are or have the potential to be affected by motor vehicle travel	6 key viewsheds; however, all 22 key viewsheds may potentially have negative effects on visual resources due to the continued proliferation of cross-country motor vehicle travel	0 key viewsheds; no negative effects on visual resources from all key viewsheds	0 key viewsheds; no negative effects on visual resources from all key viewsheds	0 key viewsheds; no negative effects on visual resources from all key viewsheds	0 key viewsheds; no negative effects on visual resources from all key viewsheds

Under Alternatives 2, 4, and 5, there are no key viewsheds being affected by continued cross-country motor vehicle travel because cross-country motor vehicle travel is prohibited. The proposed NFTS additions have no negative effects on visual resources from any of the key viewsheds because of the reasons listed below:

- “Walls” of trees or earth forms (hillsides, rock cliffs, rolling hills) enframe the views on the sides of travel routes directing the viewer’s attention inwards and screening views beyond the immediate foreground (0 ft to 300 ft).
- Views from recreational areas are enclosed by “walls” of trees or earth forms (hillsides, rock cliffs, rolling hills) screening views beyond the immediate foreground (0 ft to 300 ft) or foreground (300 ft to 1/2 mile).
- The proposed NFTS additions are outside the viewshed of immediate foreground (0 ft to 300 ft), foreground (300 ft to 1/2 mile) and middleground (1/2 mile to 4 miles).

Under Alternative 3, there are no key viewsheds being affected by continued cross-country motor vehicle because cross-country motor vehicle travel is prohibited. No new facilities would be added to the NFTS resulting in no change in effect for visual resources from key viewsheds.

Under the No Action Alternative (Alternative 1), cross-country motor vehicle travel would continue. The proposed NFTS additions in Alternatives 2, 4, and 5 are in Alternative 1. Similar to the Alternatives 2, 4, and 5, there are no visual resources effects from any of the key viewsheds for these same facilities in Alternative 1. However, Alternative 1 includes all unauthorized routes and areas inventoried on the SNF, so there are additional routes and areas to analyze in Alternative 1 than there are in the Action Alternatives. Only the routes and areas within Retention and Partial Retention VQOs were analyzed. There are six key viewsheds that are affected by motor vehicle travel due to continued cross-country motor vehicle travel in Alternative 1. However, all 22 key viewsheds may potentially have negative effects on visual

resources due to the continued proliferation of cross-country motor vehicle travel. Because cross-country motor vehicle travel would continue, there may be an increase of unauthorized routes and unauthorized areas. The proliferation of unauthorized routes and unauthorized areas may occur in sparsely canopy covered landscapes within Retention and Partial Retention VQOs and within any of the 22 key viewsheds. As a result, the unauthorized routes and areas may be visible from all 22 key viewsheds due to the absence of “walls” of trees or earth forms in the viewing distance zones of immediate foreground (0 ft. to 300 ft.) or foreground (300 ft. to 1/2 mile); reducing the scenic character of the forest.

3.5.3 Compliance with the LRMP and Other Direction

All alternatives, except for Alternative 1, comply with the LRMP as amended, NFMA and the Travel Management Rule. The proposed NFTS additions (roads, motorized trails, areas) in each action alternative (Alternatives 2, 4 and 5) are in compliance with the VQOs of Retention and Partial Retention. All alternatives, except for Alternative 1, have no cumulative effects on key viewsheds as defined in the LRMP.

This analysis has considered the best available science, including, but not limited, to the following: papers, reports, literature reviews, citations, peer reviews, science consistency reviews, GIS corporate database, aerial photos, Visual Management System (VMS), results of field reconnaissance and local field data.

3.6 Cultural Resources

3.6.1 Introduction

The Congress in 1966 declared it to be our National policy that the Federal government “administer Federally owned, administered or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations (National Historic Preservation Act of 1966, as amended (16 U.S.C. 470-1(3) (NHPA)).” This policy was made more explicit when the NHPA was amended in 1980 and Section 110 was added to expand and underscore Federal agency responsibility for identifying and protecting historic properties and avoiding unnecessary damage to them. Many historic properties are fragile and once damaged or destroyed they cannot be repaired or replaced.

Section 106 of the NHPA compels Federal agencies to take into account the effect of its undertakings on any district, site, building, structure or object that are included in or eligible for inclusion in the National Register of Historic Places (36 CFR 60) (Historic Properties). The Travel Management Rule requires that the effects on cultural resources be considered, with the objective of minimizing damage, when designating roads, trails and areas for motor vehicle use on National Forest System lands (36 CFR 212.55(a), 212.55(b)(1)).

Analysis Framework: Statute, Regulation, LRMP and Other Direction

Direction relevant and specific to the alternatives analysis as it affects cultural resources includes:

The Forest Service is directed to identify, evaluate, treat, protect and manage historic properties by several laws. However, the NHPA provides comprehensive direction to Federal agencies about their historic preservation responsibilities. Executive Order 11593, entitled *Protection and Enhancement of the Cultural Environment*, also includes direction about the identification and consideration of historic properties in Federal land management decisions.

The NHPA extends the policy in the Historic Sites Act of 1935 (49 Stat. 666; 16 U.S.C. 461-467) to include resources that are of State and local significance, expands the National Register of Historic Places (NRHP) and establishes the Advisory Council on Historic Preservation and State Historic Preservation Officers. NHPA Section 106 directs all Federal agencies to take into account effects of their undertakings (actions, financial support and authorizations) on properties included in or eligible for the National Register. The Advisory Council on Historic Preservation’s (ACHP) regulations (36 CFR 800 *Protection of Historic Properties*) implements NHPA Section 106. NHPA Section 110 sets inventory, nomination, protection and preservation responsibilities for Federally-owned historic properties.

The Forest Service policy for compliance with Section 106 of the NHPA in travel management with respect to route designation for motor vehicle use was issued in 2005: *USDA Forest Service Policy for Section 106 of the NHPA Compliance in Travel Management: Designated Routes for Motor Vehicle Use* (USDA-FS 2005). This policy was developed in consultation with the ACHP. It outlines minimal requirements for considering possible effects to historic properties that may be associated with designating unauthorized routes and areas as part of the NFTS. This policy statement recognizes that forests with programmatic agreements for compliance with Section 106 of the NHPA will follow the terms of those agreements.

Programmatic agreements (36 CFR 800.14(b)) provide alternative procedures for complying with 36 CFR 800. The Pacific Southwest Region has such an agreement: *Programmatic Agreement among the USDA, Forest Service, Pacific Southwest Region, USDA Forest Service,*

Intermountain Region's Humboldt-Toiyabe National Forest, California State Historic Preservation Officer and Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Designating Motor Vehicle Routes and Managing Motorized Recreation on the National Forests in California (USDA-FS 2006) (Motorized Recreation PA). This agreement defines the Area of Potential Effects (APE) (36 CFR 800.4(a)(1)) and includes a strategy outlining the requirements for cultural resource inventory, evaluation of historic properties and effect determinations; it also includes protection and resource management measures that may be used where effects may occur.

Executive Order 11593 - *Protection and Enhancement of the Cultural Environment*, issued May 13, 1971, directs Federal agencies to inventory cultural resources under their jurisdiction, to nominate to the NRHP all federally owned properties that meet the criteria, to use due caution until the inventory and nomination processes are completed and to assure that Federal plans and programs contribute to preservation and enhancement of non-Federally owned properties.

In the Forest Land and Resource Management Plan (LRMP), the SNF has identified three objectives to integrate cultural resource management with other multiple use management (LRMP 3.19):

1. Meet legal requirements for inventory, evaluation and interpretation of cultural resources.
2. Assist local Native American communities in continuation and enhancement of their cultural traditions.
3. Interpret the cultural history of the forest for the public.

In accomplishing these objectives, the SNF needs to manage and protect cultural resources by monitoring activities and natural occurrences and taking preventative and mitigative actions. Management direction emphasizes site identification, evaluation and management (LRMP 4.3.18) through a set of Standards and Guidelines (S&G) (LRMP 4.5.2.15):

1. **Identification:** project-specific and forest wide inventories for cultural resources (S&G 193, 194).
2. **Evaluation:** NRHP evaluations and nominations (S&G 193, 195, 203).
3. **Management:** programs for contributions to research (S&G 196); coordination with Native Americans (S&G 197, 198); protection and preservation of sites (S&G 199, 200, 201); development of management plans (S&G 202, 204); and interpretation of cultural history (S&G 205).

Effects Analysis Methodology

General Guidelines for Effects Analysis for Cultural Resources

The following factors were considered in making determinations of effect:

1. **Spatial:** The location of the historic property is the unit of spatial analysis when considering effects in action alternatives. For some historic properties (e.g., Traditional Cultural Property), the setting beyond the historic property's location must also be considered when determining whether an adverse effect will occur.
2. **Effects Timeframes:**
 - Short-term effects occur within 1 year.
 - Long-term effects occur up to 20 years.

- Cumulative effects should be analyzed at a 20-year interval.
3. **Measurement Indicator and Rationale:** All cultural resources identified within the APE for all alternatives adding facilities to the NFTS are considered historic properties for the purposes of this undertaking, unless they already have been determined not eligible in consultation with the State Historic Preservation Officer (SHPO) or through other agreed on procedures (36 CFR 60.4; 36 CFR 800). When assessing direct, indirect and cumulative effects, base assessments on a historic property's possessing at least one of the following NRHP values (36 CFR 60.4(a – d)) unless specific information already exists:
 - Prehistoric archaeological site: Criterion D
 - Historic archaeological sites: Criterion D
 - Historic structures: Criterion C
 4. **Additional prospective NRHP values (36 CFR 60.4(a)(b)).** When assessing effect under Section 106 of the NHPA, an undertaking can have no effect, no adverse effect or an adverse effect. An adverse effect to a historic property can occur when an undertaking directly or indirectly causes alterations in its important characteristics or use. An adverse effect is measured by the degree to which it diminishes its location, design, setting, materials, workmanship, feeling or association (Integrity Measures) (36 CFR 800.5(a)(1)). These integrity measures can also be used to characterize the nature of any potential effects, whether they are direct, indirect or cumulative effects; and their severity, whether they are negligible, minor, moderate or major (Table 3- 42). The degree to which historic property values are diminished will be used to measure the direct, indirect and cumulative effects of motor vehicle use on the NFTS.

Table 3- 42. Severity of Effects

Severity of Effects	Working Definition	Explanatory Notes
Negligible	Area/ unauthorized route bisects some portion of the site, but the effect on NRHP values is insignificant	If the integrity measure is determined to be “negligible,” there is essentially no measurable effect on the resource; therefore no mitigation measures are prescribed. No distinction is made between “no” disturbance and “negligible” disturbance. These sites are determined to be within the APE of some length of an unauthorized route or area. Therefore it is more appropriate to describe the most innocuous effects as “negligible” as opposed to “none.” In either case, no protection measures are prescribed, so the outcome is identical.
Minor	Effects on historic properties are relatively minor, but not insignificant. Integrity of the NRHP values may diminish if measures are not taken to alleviate the potential adverse effect.	If the severity of effect is determined to be “minor,” the nature of the effect is problematic, ambiguous or indeterminate. Monitoring is prescribed to determine whether the severity of effect will increase over time or whether additional degrading effects are likely and if so, whether measures are available to protect properties. The threshold between a “minor” and “moderate” threat is more subjective than others.
Moderate	Effects on historic properties are either localized or noted in multiple areas. Materials associated with NRHP values exhibit some degree of damage or alteration, but NRHP integrity can be retained if the detrimental activity is curtailed.	If the integrity measure is determined to be “moderate,” in most cases the preferred treatment measure will be to redesign the unauthorized route or area to exclude the site from effect. In some cases, the nature of the site appears to qualify for programmatic treatment through application of the California Archaeological Resource Identification and Data Acquisition Program (CARIDAP). Qualifying resources under CARIDAP programs are not eligible to the NRHP and need no further management consideration.
Major	Effects on historic properties are severe. If that particular unauthorized route is added to the system without mitigation measures, the action would result in adverse effects to the NRHP values.	If the effect is determined to be “major,” more complex and potentially costly mitigation measures are required to prevent an adverse effect to the resource. In some cases, the only viable option may be to close the unauthorized route or re-route the activity around the resource. NRHP evaluation of some types of properties can be managed using the California Archaeological Resource Identification and Data Acquisition Programs (CARIDAP). Another measure is evaluation of NRHP eligibility (scientific data recovery) and determination of effect. This requires additional consultation under 36 CFR §800.

A direct effect would be caused by motor vehicle use or the consequences of such use, including physical damage resulting in or from erosion, down-cutting, rutting or displacement or damage to cultural features.

Indirect effects are associated with motor vehicle uses but occur outside unauthorized routes and areas, such as adjacent dispersed camping areas or areas where motorized travel off of unauthorized routes or areas may occur. The proximity of sensitive cultural resources, such as rock art, rock shelters, historic structures and Traditional Cultural Properties (TCP), to unauthorized routes or areas is important when determining where resources could be susceptible to greater threats or risks. Indirect effects could include those listed for direct effects, but also include destructive actions like vandalism and looting.

If designation or use of unauthorized routes and areas may diminish the known or prospective values of a historic property, then there is a direct or indirect effect. The protection and management measures in Appendix A should be used where applicable and feasible to lessen or diminish identified effects. Their use would result in the historic property not being affected (i.e., equivalent of no adverse effect). Direct or indirect effects that cannot be treated using measures in Appendix B of the Motorized Recreation PA (found in the project record) may have an adverse effect on historic properties and require consultation with the State Historic Preservation Officer (SHPO). Where these measures are not applicable or feasible, consultation with the SHPO is necessary to identify other alternative protection measures or other procedures to comply with 36 CFR 800. Where there is uncertainty about possible direct or indirect effects to properties within or in proximity to the APE, including at risk properties described in the Motorized Recreation PA, monitoring may be prescribed. If cumulative effects are identified, consultation with the SHPO under 36 CFR 800 is required to identify any required mitigation measures. Site specific mitigation measures are disclosed within the applicable alternative.

The Motorized Recreation PA allows for the addition of unauthorized routes (roads, trails and areas) to the NFTS and their use by the public within historic properties provided such use has been considered by a professional archaeologist (i.e., there is no additional impact to the property expected through managed use of the route or area). Information about past or current effects to historic properties, documented in cultural resource records or obtained during the archaeological inventory, provide a baseline for assessing effects. This baseline can also be a good indicator of effects that will continue, unless measures are employed to avoid, minimize or mitigate them. It also provides a basis for estimating the severity of effects if use increases after addition to the NFTS.

For adding unauthorized routes or areas to the NFTS, the following questions were considered when determining whether such actions could have a direct, indirect or cumulative effect on historic properties.

Defined route or area: Is use restricted or confined to the established prism? Is route well-defined with established routes vs. interweaving, multiple routes and/or otherwise confined to established imprint by vegetation or other limiting physical features?

Stability of ground surface: Are soils loose or friable and subject to erosion; or stable consisting of natural pavement or other hardened surface?

Potential subsurface cultural deposits: Does the archaeological or historical site have known subsurface cultural deposits or is it a type that is likely to have such deposits?

Public use: Is there evidence of parking on the archaeological or historic site or people visiting or walking on the site?

Visibility or public attraction: Is the archaeological or historic site visible to the public or does it possess cultural or natural features attractive to the public?

Assumptions Specific to Cultural Resources Analysis

1. Unauthorized routes and areas have already affected historic properties within unauthorized route/area prisms.
2. Under the action alternatives, use will continue at current levels or increase over time on the designated system with the prohibition of cross-country motorized travel. Analysis of effects focuses on the potential for any effect associated with current or increased use levels.
3. All vehicle class types (both greater than and less than 50" vehicle types) have a similar effect to cultural resources.

Data Sources

1. Site specific cultural resource inventories were conducted as required under the Motorized Recreation PA. Information about the location of historic properties and the nature of past or current effects is available for those unauthorized routes and areas being considered for addition to the NFTS, as documented in the cultural resource inventory reports at the Bass Lake Ranger District (Mogge 2008) and the High Sierra Ranger District (Marsh 2008). For each cultural resource, one of the following management options is proposed: 1) the unauthorized route or area was considered and the effects of adding the unauthorized route or area to the NFTS will not be adverse (routine maintenance is assumed); 2) the unauthorized route was considered and site specific mitigation is prescribed to reduce the effects to less than adverse; or 3) the unauthorized route or area was considered and a determination was made that the effects would be adverse and evaluation is required per the Motorized Recreation PA.
2. Existing information from cultural resource records, historic archives, maps and GIS spatial layers was reviewed to provide specific information about historic properties or the likelihood that unidentified properties might exist in non-inventoried areas and is documented in the cultural resource inventory reports for the Bass Lake Ranger District (Mogge 2008) and the High Sierra Ranger District (Marsh 2008).

Cultural Resources Measurement Indicators

- Degree to which the integrity of historic property values are diminished.
- Number of historic properties within unauthorized routes and areas at risk from ongoing use.
- Average number of historic properties per acre at risk if new routes or areas are created.

Cultural Resources Methodology by Action

The analysis methodologies for each of the four actions that make up the alternatives and cumulative effects of the actions are described below.

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: SNF scale where motor vehicle use is not already prohibited by law (e.g., wilderness). (Figure 1-3 displays areas where Cross-country motor vehicle travel is currently prohibited.)

Indicator(s): (1) Number of historic properties within unauthorized routes at risk from ongoing use; and (2) Average number of historic properties per acre at risk if new routes or areas are created.

Methodology: GIS analysis to identify: (1) the number of historic properties at risk within existing unauthorized routes (estimate of on-going Direct and indirect effects curtailed); and (2) the average number of historic properties per acre that would be protected from any new routes created in the future without a prohibition (estimate of indirect effects).

Rationale: Motorized Recreation PA.

2. Direct and indirect effects of adding facilities (presently unauthorized roads, trails and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Location of historic property.

Indicator(s): Degree to which the integrity of historic property values are diminished, related to: location, design, setting, materials, workmanship, feeling or association.

Methodology: Use existing data from cultural resource site atlas, historic archives, maps, site record files and GIS spatial layers and information obtained from cultural resource inventories of unauthorized routes and areas to identify cultural resources in the APE that may have direct, indirect or cumulative effects.

Rationale: Motorized Recreation PA.

3. Changes to the NFTS (this includes changing vehicle class, changing season of use, and opening or closing roads).

These actions are not considered an undertaking subject to NHPA Section 106 compliance (USDA-FS Policy for Section 106 of the NHPA Compliance in Travel Management: Designated Routes for Motor Vehicle Use (2005)). Motor vehicles can already use NFTS roads. Allowing or prohibiting non-highway legal vehicle use will have no direct, indirect or cumulative effect on cultural resources.

4. Non-Significant LRMP Amendments

These actions are not considered an undertaking subject to NHPA Section 106 compliance. As explained in section 3.1.1 the non-significant LRMP amendments do not have unique effects when compared to the other actions analyzed in this FEIS. Therefore the environmental consequences have been analyzed and will not be discussed further in the cultural resources section.

5. Cumulative Effects

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial boundary: SNF administrative boundary (outside of designated wilderness). The geographic scope of the cumulative effects analysis is the project area boundary. It was selected because impacts to cultural resources accumulate at the specific location of the cultural resources, irrespective of actions in surrounding areas. Due to this fixed nature of cultural resource sites, the geographical scope is limited to the SNF administrative boundary (outside of designated wilderness).

Indicator(s): Degree to which the integrity of historic property values are diminished, related to: location, design, setting, materials, workmanship, feeling or association.

Methodology: The cumulative effects of each alternative (all actions) will describe the additive impact of the alternatives to the existing forest situation.

Rationale: Motorized Recreation PA.

3.6.2 Affected Environment Common to All Analysis Units

All throughout the SNF are the remnants of past cultures that illustrate the centuries-old relationships between people and the land. These cultural resources hold clues to past ecosystems and human adaptations to them, provide links between living communities and the forest's unique prehistoric and historic land uses and help transform a visit to the woods into an encounter with history. These cultural resources comprise an irreplaceable and non-renewable resource record of past human life and land use. This record is contained in properties with archaeological, historical and other values recognized in the criteria for listing on the NRHP and locations of cultural importance to local Native American groups.

Archaeological and Historic Values: Cultural resources are the buildings, sites, areas, architecture and properties that bear evidence of human activity and use and have scientific, historic and cultural importance. As of 2008, about 4,500 archaeological and historical properties have been recorded on the SNF, as a result of about 600 mostly project-related cultural resource surveys for compliance with the provisions of the NHPA. Over 500,000 acres have been inventoried for archaeological and historical properties, out of the total forest area of almost 1.3 million acres. This inventory includes much of the 560,000 acre timber land base, but very little of the 527,000 acres in the five designated wildernesses. The cultural resources are not distributed equally across this acreage, but clustered according to the natural resources that were being used (e.g. acorn groves, timber stands, water, mineral locations). With new discovery of cultural resources upon almost every new survey effort, it is clear there continues to be many undiscovered cultural resources in the SNF.

The SNF has one property, the Dinkey Creek Bridge, listed on the NRHP. Many other sites have had their National Register eligibility determined, including most of the historic recreation residence tracts, fire lookouts and the Big Creek Hydroelectric System Historic District, which includes reservoirs, dams, powerhouses, tunnels and other features of the hydroelectric system in the upper San Joaquin River watershed. Other locations important to the past and ongoing traditional cultural and religious practices of local Indian tribes and groups are also significant cultural resources.

Physical remains of over 10,000 years of human history are found throughout the SNF. Except for the last century and a half of written history, the only record of this long human use is the remains left by the original native people and their descendants. The processes of subsistence, the hunter-gatherer lifestyle and the resulting indigenous land use are seen in the archaeological record with features common to the material culture of the native people of the Sierra Nevada (e.g. village sites, bedrock mortars, stone tool artifacts, pictographs). Prehistoric sites within the

SNF are primarily associated with Western Mono tribes of the western side of the Sierra Nevada, but some sites are associated with Chukchansi Yokuts or Southern Sierra Miwok and their predecessors. Some of these sites have ethnographic documentation that indicates a fairly recent history of tribal use; in some cases, tribal use continues at sites that have an occupational history that spans thousands of years.

Historic-era cultural resources reflect particularly the cultural and economic products of the rapid pace of technological achievement in the last 150 years imposed on the terrain of the Sierra Nevada. These resources often reflect environmental changes resulting from industrial and technological advances in resource extraction, landscape use and management. Sites include remnants of Forest Service administration, exploration and settlement, grazing/range management, mining, water/hydropower manipulation, transportation, travel, tourism and recreation and the forest products industry. Each of these themes has an array of associated sites and features. For example, features associated with railroad logging operations may be work camps, refuse dumps, railroad grades, trestles and discarded equipment.

Hydroelectric power development in the 20th century has had the most profound overall effect on the landscape and the cultural resources within the affected area. For the most part, this development took place prior to enactment of Federal laws requiring environmental and archaeological assessments. The creation of Bass Lake, Redinger Lake, Kerckhoff Lake, Shaver Lake, Huntington Lake, Florence Lake, Lake Thomas Edison, Pine Flat Lake, Mammoth Pool, Courtright Reservoir and Wishon Reservoir has dramatically affected the landscape and pattern of forest recreational use. Hundreds of cultural resources were impacted during these massive reservoir construction projects. Roads associated with these projects followed Native American travel routes and opened wide expanses of the forest to recreational use. Historic sites associated with hydroelectric power abound and include work camps, refuse dumps, roads, bridges, electric transmission and distribution lines, pipes, tunnels and even towns. Many other types of sites can be directly or indirectly attributed to construction and maintenance of hydroelectric power in the high Sierras.

Prior to the 1974 Forest and Rangeland Renewable Resources Planning Act (RPA), effects to cultural resources were not considered during planning or implementation. Consequently, cumulative impacts of varying degrees occurred from various land management actions, including mining, timber management, road construction, livestock grazing, recreation development and hydroelectric development. Natural environmental processes and general use of the forest by the public have also contributed to effects to cultural resources, including dispersed recreation, looting, vandalism, unauthorized trail construction, wildfires, erosion and exposure. Some sites would be affected by continued and evolving use at the locations over long periods of time. Existing roads bisect or allow access to sites and locations with sensitive archaeological features or locations of concern to Native Americans. Many sites show only the effects of natural weathering and time, with no adverse human influence to their current condition. All of the cultural resources in the project area are in varying states of integrity. Project-specific condition monitoring has been an ongoing part of the cultural resource management program to identify adverse effects to known resources. In the past decade there has been an effort to increase cultural resource management programs (through NHPA Section 110) that are unrelated to Forest Service projects, to identify, evaluate and manage significant sites

Many cultural resources have been protected during past project activities by avoidance measures. These measures have resulted in a large number of sites that have not been evaluated for eligibility to the NRHP, resulting in forest management of hundreds of sites that may not be eligible for inclusion in the National Register. All reasonably foreseeable actions (i.e. projects) have been or will be subject to NHPA Section 106 compliance for consideration of effects to cultural resources.

Native American Cultural Values: Federally recognized tribal governments associated with the SNF, as elsewhere in the United States, have a special political and legal relationship with the U.S. Government. Recognized tribes are also beneficiaries of a trust relationship with the Federal government. Federal agencies, such as the Forest Service, consult with tribes as with other governments and are responsible for protecting tribal interests. The Forest Service also consults with non-recognized tribes.

There is a deep and abiding concern with many Indian people about what occurs in their aboriginal territory. The SNF honors the traditional ties that many tribal communities and Native American people have to this portion of the Sierra Nevada. Access to and use of the SNF and other public lands is critical for many Native American people, as community identity and cultural survival are dependent on continued access to ceremonial and sacred places, cemeteries, traditional gathering areas, archaeological sites and resources at a variety of locations on forest land. Certain plants, animals and locations provide for many needs, including food, medicine, utilitarian type materials and ceremonial items. Specific resources insure that significant cultural traditions, such as basket weaving, survive and continue. These areas contribute to the tribal communities' way of life, their identity, their traditional practices and cohesiveness.

Consultation with tribes, the local Native American communities and other interested parties to identify other cultural values, including contemporary Native American interests, was initiated in accordance with the Motorized Recreation PA and Section 106 of the NHPA and other laws and regulations. Consultation has consisted of meetings, letters and presentations and is documented in the project record.

Cultural Resource Management: The project area is managed for cultural resources in accordance with the direction of the Motorized Recreation PA, specifically Appendix C, *Heritage Resources Strategy for the Designation of Motor Vehicle Routes on the National Forests in California*. The stipulations of the Motorized Recreation PA satisfy the SNF responsibilities for route designation under the National Historic Preservation Act (NHPA) of 1966, as amended and take into account the potential effects of undertakings on historic properties in lieu of the procedures of 36 CFR 800.

In accordance with the Motorized Recreation PA, a cultural resource identification effort was conducted of the project area by professional archaeologists. The goal was to identify cultural resources at risk of adverse effects from motor vehicle use. The inventory consists of a combination of existing record reviews, on-the-ground survey and monitoring. Results of this investigation are reported in *Travel Management, Heritage Resource Inventory and Assessment, High Sierra Ranger District, Sierra National Forest, Archaeological Reconnaissance Report R2008051553002* (Marsh 2008) and *Travel Management, Heritage Resource Inventory and Assessment, Bass Lake Ranger District, Sierra National Forest, Archaeological Reconnaissance Report R2008051551001* (Mogge 2008). These reports, which describe the location and components of the archaeological sites, are kept administratively confidential under the provisions of ARPA, 36 CFR 296. These reports document cultural resource survey (except in minor cases where survey was deferred under the stipulations of the Motorized Recreation PA) and field-assessments of all historic properties for the entire area of potential effect (Table 3- 43).

Table 3- 43. Status of Cultural Resources Survey within APE

Item	Miles of Unauthorized routes	Acres of Areas
Previously Surveyed	94.9	116.8
Surveyed for this project	6.6	0
Unsurveyed (deferred per Motorized Recreation PA)	2.6	0
Total	104.1	116.8

In the area of potential effect, the results of almost 50 years of cultural resource surveys and investigations have identified numerous cultural resource properties that are associated with themes of SNF history. Most sites represent prehistoric lifeways; other sites represent historic-era land uses. Thirty-five cultural resource sites were documented in the area of potential effect of proposed additions to the NFTS. All of the cultural sites at risk were monitored to determine their current condition and risk of adverse effects.

The SNF manages those cultural resources which are eligible for listing on the NRHP. The SNF does not manage or protect ineligible properties in project activities, unless there is local interest in preservation. NRHP eligibility has not been determined for every cultural resource in the project area. Unevaluated sites are considered potentially eligible and managed as if eligible. The Motorized Recreation PA allows for deferred NRHP evaluation if the property would not be affected by the project, usually through application of Standard Protection Measures (Motorized Recreation PA, Appendix B).

Contemporary Native American interests can include Traditional Cultural Properties (sites associated with cultural practices or beliefs that are rooted in history and important in maintaining cultural identity) and plant gathering sites for basket materials, medicines and food resources. The SNF manages such known sites as cultural resources under the provisions of the NHPA, but where the interests of native people are considered to achieve a mutually beneficial outcome during project implementation. The location of these sites is also kept administratively confidential. The SNF will maintain appropriate access under the special use permitting process to sacred and ceremonial sites and to tribal traditional use areas. The SNF has consulted with affected tribes and tribal communities (see Society, Culture and Economic section for discussion and documentation).

Not every designated route would avoid cultural resources; however, proposed unauthorized route designations would be managed according to the provisions of the Motorized Recreation PA for no effect to cultural resources, including both archaeological values and contemporary Native American values. The nature and scope of this project are such that the potential effects of project activities to archaeological research values and contemporary cultural values can be reasonably predicted and appropriate measures can be taken to ensure the significant values of these cultural resources are not adversely affected.

3.6.3 Environmental Consequences Common to All Analysis Units

See the effects methodology section above regarding how this analysis was conducted.

Alternative 1 – No Action

Direct and Indirect Effects

This alternative has the greatest potential for continued direct and indirect adverse effects on cultural resources, and therefore the greatest risk to the preservation of the SNF's irreplaceable cultural heritage than the action alternatives since it continues cross-country travel. There are approximately 236 sites currently at risk of adverse effects from use of the 479 miles of 2,559 unauthorized routes across the ten analysis units on the SNF, or one site for every 2 miles of unauthorized route and almost one site for every ten unauthorized routes. Despite the prohibition of motorized cross-country travel in the area closed by the 1977 Forest ORV Plan, unauthorized motor vehicle travel off of NFTS roads and trails has continued (note: SNF law enforcement actions based on Forest Order 15-77-3 are likely to have deterred a percentage of the possible use). The creation of new unauthorized routes would have the potential for adverse effects on additional cultural resources, including direct effects from motor vehicle use on sensitive sites, indirect effects of increased erosion potential, motor vehicle camping on sites, vandalism and damage to historic structures and archaeological features. The direct and indirect effects under this alternative would result in a 'status quo', in that the present random and unmitigated impacts to cultural resources would continue, resulting in irretrievable losses of integrity and NRHP values. One-year and 20-year effects would be similar but compounded with time, with potential effects continuing on some sites.

Cumulative Effects

The cumulative effects of this alternative would result from the continued use and creation of unauthorized routes, opening up new areas that may subject cultural resources to potential impacts and vandalism that have been as yet unaffected. Over time, unmitigated adverse effects to historic property values would accumulate. The effects of past and present actions contribute to the current condition of cultural resources across the forest. Foreseeable future SNF actions would be subject to NHPA compliance and are not expected to contribute to negative cumulative effects.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

This action would greatly reduce the potential for on-going adverse impacts to cultural resources, as compared to Alternative 1, by prohibiting cross-country travel, effectively reducing the miles available for motorized use. It would limit new effects to cultural resources not currently associated with an unauthorized route. This potential effect is difficult to measure in that sites are not distributed equally across acres accessible to motor vehicles, but are generally clustered around specific natural resources. There is significantly less than one known site per acre across the ten analysis units. However, it is the experience of forest cultural resources staff that where modern recreation activities take place, like motor vehicle use, those areas are generally likely to include remains of historic or prehistoric users attracted to the same resources (e.g. water, camping areas, viewsheds). For example, the majority of developed campgrounds on the SNF have cultural resources in or adjacent to them. Prohibiting cross-country travel would almost eliminate the likelihood of new adverse effects to sites from motor vehicle use. Compared to Alternative 1, this action would have a major beneficial effect on cultural resources throughout

the forest. One-year and 20-year effects would be similar; those sites associated with unauthorized routes not added to the NFTS would see curtailed impacts.

Addition of Facilities

This action would greatly reduce the potential for adverse effects to cultural resources, as compared to Alternative 1, through the identification of actual effects and the implementation of measures to mitigate those effects to negligible, if necessary. Table 3- 44 summarizes the effects on cultural resources by this action. Six cultural resources associated with the APE of ten roads, trails or areas proposed for inclusion in the NFTS are potentially affected by this action. Four sites are identified with moderate direct effects where the integrity of the site has been adversely affected. However, for these four sites a Standard Protection Measure of the Motorized Recreation PA (Appendix B) will be implemented, as indicated in Table 3- 44, below. Standard Protection Measures are intended to provide effective protection of those values of the historic property that may make it eligible for listing on the NRHP. By applying a specific Standard Protection Measure to each site (as fully described in the cultural resources reports in the project record), the severity of effect will be reduced to negligible for designation and continued use of the routes. Three sites are identified as having negligible effect where, although motorized use is occurring, the integrity of the site has not been adversely affected and no mitigation is required.

Certain actions for specific unauthorized routes proposed as design features, mitigation measures, and preventative measures to manage potentially adverse effects on aquatic species, soils and water, botanical resources, and transportation are discussed in the applicable sections of Chapter 3, and displayed in Appendix A. In some cases, these preventative actions also have the potential for adverse effects to specific cultural resources on these unauthorized routes, in addition to the effects of motorized recreation use. These preventative actions for other resources have been reviewed in the interdisciplinary process, and if necessary, cultural resource protection/mitigation actions derived from the Motorized Recreation PA will be implemented to reduce any potential effect to negligible, as described in the cultural resource reports and Appendix A.

Specifying periods of use for certain motor vehicle facilities (roads, trails, areas) may reduce or prevent damage to cultural sites from displacement and disturbance of soils.

This alternative reduces the potential for adverse effects from motor vehicles by reducing the number of unauthorized route miles and area acres available for use, as compared to Alternatives 1, 4 and 5.

One-year and 20-year effects would be similar.

Changes to the NFTS

These actions are not considered undertakings. Actions allowing or prohibiting non-highway legal vehicle use will have no direct or indirect effects on cultural resources, as stated in the Cultural Resources Methodology by Action section. Establishing wet weather or other closure periods for NFTS facilities may also act to reduce or prevent potential damage to cultural sites from displacement and disturbance of soils.

Cumulative Effects

This alternative would almost eliminate potential future impacts to cultural resources by prohibiting cross-country travel, and the effects from the addition of facilities either are negligible, or will be mitigated to negligible. Overall, this alternative will reduce adverse effects to historic property values of cultural resources across the forest, as compared to Alternatives 1, 4 and 5. The additive impact of this alternative would be long-term beneficial effects as a result of

managing current and potential future effects from motorized recreation through compliance with the NHPA. In general, effects to cultural resources by the NFTS will continue until assessed and management actions are implemented.

All future permitted or other authorized motor vehicle travel off designated roads, trails and areas (e.g. vegetation treatment, special use permitted activities, etc.) will be subject to NHPA Section 106 compliance, with potential effects to cultural resources identified at that time.

Table 3- 44. Alternative 2 – Effects to Cultural Resources

Unauthorized Route/Area ID	Site Number	Type of Effect ¹	Nature of Effect ²	Severity of Effect ³	Protection/Mitigation
KD-19	05155400497	Direct	Disturbance	Negligible	None
JM-36	05155100463	Direct	Erosion, displacement	Moderate	SPM ⁴ II.A.2.: Padding
JM-7ay	05155101243	Direct	Displacement	Moderate	SPM II.A.2.: Padding
JM-20y	05155700121	Direct	None	Negligible	None
JM-36	05155700212	Direct	Erosion, displacement	Moderate	SPM II.A.2.: Padding
JM-21y JM-23 JSM107 TH-41y	05155700287	Direct	Disturbance	Negligible	None
SV35	05155700287	Direct	Down-cutting, rutting	Moderate	SPM II.A.4.a.: Temporary (wet season) closure

¹Type of Effect: None, Direct, Indirect, Cumulative

²Nature of Effect: erosion, down-cutting, rutting, displacement, disturbance, damage, deteriorate, vandalism, looting, removal/alteration of historic structure, visual/audible/atmospheric to historic setting or cultural landscape/Traditional Cultural Property, (specify others)

³Severity of Effect: negligible, minor, moderate or major

⁴SPM: Standard Protection Measure from the Motorized Recreation PA

Alternative 3

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Under this alternative, the prohibition of cross-country travel would have the same effects forestwide as described in Alternative 2 (above); therefore this action would greatly reduce the potential for adverse impacts to cultural resources from cross-country travel, and almost eliminate the likelihood of new adverse effects to sites from motor vehicle use.

Additions to the NFTS

This action would have the greatest benefit to cultural resources. No facilities would be added under this alternative; therefore, there are no cultural resources associated with this action and there would be no direct, indirect or cumulative effects of this action.

Changes to the NFTS

There are no proposed changes to the NFTS in this alternative.

Cumulative Effects

This alternative would reduce the long-term potential effects to the historic property values of cultural resources by prohibiting cross-country travel.

This alternative should reduce the most adverse effects to cultural resources across the forest, as compared to Alternatives 1, 2, 4 and 5, as the least number of cultural sites would be at risk from motorized use. The additive impact of this alternative would be long-term beneficial effects as a result of managing current and future effects through compliance with the NHPA.

Alternative 4

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Effects are the same as in the discussion in Alternative 2, above.

Additions to the NFTS

This action would greatly reduce the potential for adverse effects to cultural resources, as compared to Alternative 1, through the identification of actual effects and the implementation of measures to mitigate those effects to negligible, if necessary. Table 3- 45 summarizes the effects on cultural resources by this action. Twelve cultural resources associated with thirteen unauthorized routes or areas proposed for inclusion in the NFTS are potentially affected by this action. Through implementation of the protection/mitigation actions identified in the table and derived from the Motorized Recreation PA, the effects will be mitigated. No sites are identified with the effect severity of 'major' or 'moderate', where is, the integrity of the site has been adversely affected. Four sites are identified as having minor direct effects, where the nature and origin of the effect is ambiguous and may not be direct effects of motor vehicle use. For these sites, monitoring per the Motorized Recreation PA is recommended to determine if mitigation measures will be needed in the future. Eight sites are identified as having negligible effect, where although motorized use is occurring, the integrity of each site has not been adversely affected and no mitigation is required.

Certain actions for specific unauthorized routes proposed as design features, mitigation measures, and preventative measures to manage potentially adverse effects on aquatic species, soils and water, botanical resources, and transportation are discussed in the applicable sections of Chapter 3, and displayed in Appendix A. In some cases, these preventative actions also have the potential for adverse effects to specific cultural resources on these unauthorized routes, in addition to the effects of motorized recreation use. These preventative actions for other resources have been reviewed in the interdisciplinary process, and if necessary, cultural resource protection/mitigation actions derived from the Motorized Recreation PA will be implemented to reduce any potential effect to negligible, as described in the cultural resource reports and Appendix A.

Specifying periods of use for certain motor vehicle facilities (roads, trails, areas) may reduce or prevent damage to cultural sites from displacement and disturbance of soils.

This alternative is similar to Alternative 2 in that it reduces the potential for adverse effects from motor vehicles by reducing the number of unauthorized route miles and area acres available for

use, as compared to Alternatives 1 and 5, as this alternative specifically responds to issues of impacts to natural and cultural resources.

One-year and 20-year effects would be similar.

Changes to the NFTS

These actions are not considered undertakings. Actions allowing or prohibiting non-highway legal vehicle use will have no direct or indirect effect on cultural resources, as stated in the Cultural Resources Methodology by Action section. Establishing wet weather or other closure periods for NFTS facilities may reduce or prevent damage to cultural sites from displacement and disturbance of soils.

Cumulative Effects

This alternative would reduce potential impacts to cultural resources by prohibiting cross-country travel. The additive impact of this alternative would be long-term beneficial effects as a result of managing current and potential future effects from motorized recreation through compliance with the NHPA.

Overall, this alternative will reduce adverse effects to cultural resources across the forest, as compared to Alternatives 1 and 5, as fewer cultural sites are at risk from motorized use and those sites have minor or negligible effects from that use.

Table 3- 45. Alternative 4 – Effects to Cultural Resources

Unauthorized Route/Area ID	Site Number	Type of Effect ¹	Nature of Effect ²	Severity of Effect ³	Protection/Mitigation
TH-28z	05155100630	Direct	Disturbance	Negligible	None
TH-20u	05155500309	Direct	Disturbance	Negligible	None
JSM50	05155500596	Direct	Displacement	Minor	Monitoring
TH-56y	05155500820	Direct	Disturbance	Negligible	None
TH-56y	05155500821	Direct	Disturbance	Negligible	None
TH-20u	05155500852	Direct	Displacement	Minor	Monitoring
JSM63	05155501026	Direct	Displacement	Minor	Monitoring
PUB-18	05155501048	Direct	Disturbance	Negligible	None
JG61 JSM54 JSM56	05155501077	Direct	Disturbance	Negligible	None
TH-09	05155700219	Direct	Displacement	Minor	Monitoring
JM-23a	05155700287	Direct	Disturbance	Negligible	None
TH-41y	05155700433	Direct	Disturbance	Negligible	None

¹Type of Effect: None, Direct, Indirect, Cumulative

²Nature of Effect: erosion, down-cutting, rutting, displacement, disturbance, damage, deteriorate, vandalism, looting, removal/alteration of historic structure, visual/audible/atmospheric to historic setting or cultural landscape/Traditional Cultural Property, (specify others)

³Severity of Effect: negligible, minor, moderate or major

Alternative 5

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Effects are the same as in the discussion in Alternative 2, above.

Additions to the NFTS

This action would reduce the potential for adverse effects to cultural resources, as compared with Alternative 1, through the identification of actual effects and the implementation of measures to mitigate those effects, if necessary. Table 3- 46 below summarizes the effects on cultural resources by this action. Twenty-three cultural resources associated with the APE of thirty-four unauthorized routes or areas proposed for inclusion in the NFTS are potentially affected by this action. Seven sites are identified with moderate direct effects where the integrity of the site has been adversely affected and one site is identified with the effect severity of 'major', where the integrity of the site has been adversely affected to a significant degree. For these seven sites a Standard Protection Measure of the Motorized Recreation PA (Appendix B) will be implemented. Standard Protection Measures are intended to provide effective protection of those values of the historic property that may make it eligible for listing on the NRHP. By applying a specific Standard Protection Measure to each site (as fully described in the Cultural Resources reports in the project record), the severity of effect will be reduced to negligible for designation and continued use of the unauthorized routes. Nine sites are identified as having minor direct effects, where the nature and origin of the effect is ambiguous and may not be direct effects of motor vehicle use. For eight of these sites, monitoring per the Motorized Recreation PA is recommended to determine if mitigation measures will be needed in the future. The other requires a protective action. Nine sites are identified as having negligible effect, where although motorized use is occurring, the integrity of the site has not been adversely affected and no mitigation is required.

Certain actions for specific unauthorized routes proposed as design features, mitigation measures, and preventative measures to manage potentially adverse effects on aquatic species, soils and water, botanical resources, and transportation are discussed in the applicable sections of Chapter 3, and displayed in Appendix A. In some cases, these preventative actions also have the potential for adverse effects to specific cultural resources on these unauthorized routes, in addition to the effects of motorized recreation use. These preventative actions for other resources have been reviewed in the interdisciplinary process, and if necessary, cultural resource protection/mitigation actions derived from the Motorized Recreation PA will be implemented to reduce any potential effect to negligible. For unauthorized routes AE-23 and ES10, the proposed ground-disturbing mitigations will only be implemented outside of the boundaries of the cultural resources (see Table A-1, Appendix A, and the cultural resource reports in the project record).

Specifying periods of use for certain motor vehicle facilities (roads, trails, areas) may reduce or prevent damage to cultural sites from displacement and disturbance of soils.

This alternative is similar to Alternative 2 in that it reduces the potential for adverse effects from motor vehicles by reducing the number of unauthorized route miles and area acres available for use, compared to Alternative 1, as this alternative responds to issues regarding motorized access.

One-year and 20-year effects would be similar.

Changes to the NFTS

These actions are not considered undertakings. Actions allowing or prohibiting non-highway legal vehicle use will have no direct, indirect or cumulative effect on cultural resources, as stated in the Cultural Resources Methodology by Action section. Establishing wet weather closure periods for NFTS facilities may act to reduce or prevent potential damage to cultural sites from displacement and disturbance of soils.

Cumulative Effects

This alternative would reduce potential impacts to historic property values of cultural resources by prohibiting cross-country travel. The additive impact of this alternative would be long-term beneficial effects as a result of managing current and potential future effects from motorized recreation through compliance with the NHPA.

Overall, this alternative should reduce adverse effects to cultural resources across the forest, as compared to Alternative 1, although not as much as Alternatives 2, 3 and 4 since it contains the most cultural resource sites with effects, as it responds to issues of motorized access.

Table 3- 46. Alternative 5 – Effects to Cultural Resources

Unauthorized Route/Area ID	Site Number	Type of Effect ¹	Nature of Effect ²	Severity of Effect ³	Protection/ Mitigation
ES10	05155300505	Direct	Displacement	Minor	Monitoring
AE-23, BLUCYN4, BLUCYN6	05155400356	Direct	Displacement	Minor	Monitoring
BLUCYN6	05155400259	None	None	None	None
BLKRCK78	05155400744	Direct	Displacement	Minor	Monitoring
JM-36	05155100463	Direct	Erosion, displacement	Moderate	SPM ⁴ II.A.2: Padding
JM-14x	05155100607	Direct	Displacement	Moderate	SPM II.A.2: Padding SPM II.A.3: Physical barrier
TH-28z	05155100630	Direct	Disturbance	Negligible	None
TH-29z	05155100635	Direct	Disturbance	Negligible	None
TH-20u	05155500309	Direct	Disturbance	Negligible	None
JSM50	05155500596	Direct	Displacement	Minor	Monitoring
TH-56y	05155500820	Direct	Disturbance	Negligible	None
TH-56y	05155500821	Direct	Disturbance	Negligible	None
TH-20u	05155500852	Direct	Displacement	Minor	Monitoring
JSM63	05155501026	Direct	Displacement	Minor	Monitoring
PUB-18	05155501048	Direct	Disturbance	Negligible	None
BP21 JG61 JM-4z JSM54 JSM56	05155501077	Direct	Disturbance	Negligible	None

Unauthorized Route/Area ID	Site Number	Type of Effect ¹	Nature of Effect ²	Severity of Effect ³	Protection/Mitigation
JG10	05155501077	Direct	Displacement, disturbance, damage, removal/alteration of historic structure	Major	SPM II.A.3: Physical barrier
JM-13x	05155700124	Direct	Displacement, erosion, damage	Moderate	SPM II.A.2.: Padding SPM II.A.3: Physical barrier
JM-14x	05155700124	Direct	Displacement, down-cutting, erosion, damage	Moderate	SPM II.A.2.: Padding SPM II.A.3: Physical barrier
JM-36	05155700212	Direct	Erosion, displacement	Moderate	SPM II.A.2.: Padding
TH-07	05155700218	Direct	Displacement	Minor	Monitoring
TH-09	05155700219	Direct	Displacement	Minor	Monitoring
ML115	05155700242 –historic component	Direct	Disturbance	Negligible	None
ML115	05155700242 – prehistoric component	Direct	Displacement	Moderate	SPM II.A.2: Padding
JM-21 JM-22y JM-23 JM-23a JSM107 TH-41y	05155700287	Direct	Disturbance	Negligible	None
SV35	05155700287	Direct	Down-cutting, rutting	Moderate	SPM II.A.4.a.: Temporary (wet season) closure
TH-51z	05155700433	Direct	Displacement	Minor	Protection: Remove boulders blocking unauthorized route

¹Type of Effect: None, Direct, Indirect, Cumulative

²Nature of Effect: erosion, down-cutting, rutting, displacement, disturbance, damage, deteriorate, vandalism, looting, removal/alteration of historic structure, visual/audible/atmospheric to historic setting or cultural landscape/Traditional Cultural Property, (specify others)

³Severity of Effect: negligible, minor, moderate or major

⁴SPM: Standard Protection Measure from the Motorized Recreation PA

Summary of Effects Analysis across All Alternatives

Based on the cultural resource indicator regarding the degree to which site integrity is diminished, Alternative 1 holds the most risk since this alternative has potentially the largest number of cultural resource sites that could be adversely affected (approximately 236 sites), while Alternative 3 has the least risk since this alternative has the least number of sites (0) that could be adversely affected. The effects of alternatives 2, 4, and 5 would be negligible (or neutral) as site integrity would be maintained through the implementation of the standard protection measures of the Motorized Recreation PA.

As to the indicator of the number of sites at risk, Alternative 3 is the most beneficial to cultural resources in the long term; it has the least potential for new or continued risk of adverse effects, as cross-country travel is prohibited and no new facilities are added, therefore the least number of cultural resource sites are at risk (0). Alternative 1 has the most risk for adverse effects, as cross-country travel continues, potentially exposing the greatest number of cultural resource sites (approximately 236 sites) to adverse direct and indirect effects from motor vehicle use.

Of the action alternatives, Alternative 5 has the most risk of adverse effects from the addition of facilities, as the most sites (23) are within the area of potential effect. Although Alternative 4 has more sites at risk in the area of potential effect (12) than Alternative 2 (6), all of the cultural resources in Alternative 4 have either negligible or minor effects, where the majority of the cultural resources in Alternative 2 have moderate effects. Implementation of standard protection measures is expected to reduce the risk of adverse effects to negligible to all of the sites from addition of facilities to the NFTS in the action alternatives.

Compliance with the LRMP the Travel Management Rule and Other Direction

Alternatives 2 - 5 are in compliance with the Travel Management Rule and LRMP standards and guidelines for inventory, evaluation, protection and management of cultural resources.

Alternatives 2 - 5 are in compliance with historic preservation law, policy and regulation, as this project meets the stipulations of the Motorized Recreation PA.

3.7 Air Quality

The SNF Travel Management project is intended to designate routes for public motor vehicle use on the SNF, as required by the new Travel Management Regulation. The regulation requires that each National Forest or ranger district designate the roads, trails and areas on National Forest System lands that are open to motor vehicles, including off-highway vehicles (OHV).

This section contains an evaluation of how air resources will be affected by the actions identified in Chapter 2 of this FEIS. The document contains policy and direction as well as a discussion of the affected environment and existing air quality conditions. This section describes the plausible environmental consequences of different alternatives. Further details are available in the project record.

Climate change has become a national concern. Gases which contribute to climate change such as carbon dioxide, methane, nitrous oxides and ozone are addressed in this section. The changes in greenhouse gasses will be reflective of impacts to climate change.

3.7.1 Introduction

Policy and Direction

Federal Air Quality Laws Relevant to Travel Management Projects

Federal Clean Air Act

The Federal Clean Air Act (CAA) is the Federal law passed in 1963 and last amended in 1990, (42 U.S.C. §7401 et seq.) which is the basis for National control of air pollution. The CAA was designed to “protect and enhance” the quality of the Nation’s air resources. Basic elements of the CAA include National ambient air quality standards (NAAQS) for criteria air pollutants, technology based emission control standards for hazardous air pollutants (HAPs), State implementation plans (SIPs), a comprehensive approach to reducing motor vehicle emissions, control standards and permit requirements for stationary air pollution sources, acid rain control measures, stratospheric ozone protection and enforcement provisions (California Air Resources Board [CARB], 2007).

Regional Haze Rule (1990 Clean Air Act Amendments), 40 CFR Part 51

In 1999, U.S. EPA passed the Regional Haze Rule, which calls for states to establish goals for improving visibility in mandatory Class I areas and to develop long-term strategies for reducing the emissions of air pollutants that cause visibility impairment.

General Conformity Rule (1990 Clean Air Act Amendments) (Section 176 (c) of the Clean Air Act (part 51, subpart W and part 93, subpart B.)

U.S. EPA passed the final General Conformity rule in 1993. Under the rule, Federal agencies must work with State and local governments in a non-attainment or maintenance area to ensure that Federal actions conform to the initiatives established in the applicable SIP (U.S. EPA 2008). A project is non-conforming if it conflicts with or delays implementation of any applicable attainment or maintenance plan. The rule divides the conformity process into two phases: applicability and determination. The San Joaquin air basin is in non-attainment for ozone and particulate matter, therefore a determination under the Conformity Rule must be made.

The EPA created de minimis emission levels to limit the need to conduct conformity determinations for actions with minimal emission increases. When the total direct and indirect emissions for the project are below the de minimis levels, the project would not be subject to a conformity determination. The de minimis levels can be found at <http://www.epa.gov/oar/genconform/deminimis.htm> (http://www.epa.gov/oar/genconform/ March 2010).

State Air Quality Laws Relevant to Travel Management Projects

California Clean Air Act (H&S §§ 39660 et seq.)

California adopted the California Clean Air Act (CCAA or Act) in 1988. The Act provides the basis for air quality planning and regulation in California independent of Federal regulations and establishes ambient air quality standards for the same criteria pollutants as the Federal clean air legislation (CARB 2007a). Under the Federal CAA, States can adopt air quality standards that are more stringent than the Federal NAAQS. California has chosen to adopt standards for criteria pollutants that are generally more restrictive than the Federal standards. The California Air Resources Board (CARB) is the agency responsible for establishing California ambient air quality standards (CAAQS), setting vehicle emission standards and fuel specifications and regulating emissions from certain types of mobile equipment and consumer products.

Table 3- 47. Pertinent California Air Quality Standards

Pollutant	Averaging Time	State Standards
Ozone	1-hour	0.09 ppm
	8-Hour	0.07 ppm
Respirable Particulate Matter (PM10)	24-Hour	50 µg/m3
	Annual Arithmetic Mean	20 µg/m3
Nitrogen Dioxide (NO2)	Annual Arithmetic Mean	0.030 ppm
	1-Hour	0.18 ppm
Fine Particulate Matter (PM2.5)	Annual Arithmetic Mean	12 ug/m3
Carbon Monoxide (CO)	8-Hour	9 ppm
	1-Hour	20 ppm
Sulfur Dioxide (SO2)	24-Hour	0.04 ppm
	1-Hour	0.25 ppm
Lead	30 Day average	1.5 µg/m3

ppm= part per million, µg/m3= micrograms per cubic meter; Source: CARB 2008.

California Air Resources Board (CARB) Off-Road Recreational Vehicle Emissions Standards Rulemaking

In 1994 the CARB approved new off-highway recreational vehicle regulations (since amended in 1998). The rulemaking established emission standards for OHVs including off-road motorcycles (dirt bikes) and ATVs (CARB 2006). OHV registration became contingent on vehicle compliance to California emissions standards. Dirt bikes and ATVs that meet emission standards are eligible for OHV Green Sticker registration and have a year-round operating period, while noncompliant vehicles fall under the OHV Red Sticker program which has a limited operational season.

Local Regulations

The San Joaquin Valley Air Pollution Control District (Valley Air District) is responsible for implementing and regulating air quality programs for the Madera and Fresno county portions of the SNF. The Valley Air District regulations can be found at: <http://www.valleyair.org/index.htm>. The Valley Air District has set rules to limit fugitive dust emissions. However, activities conducted at elevation of 3,000 feet or higher above sea level are exempt.

The Mariposa County Air Pollution Control District (APCD) is responsible for implementing and regulating air quality programs for the Mariposa county portion of the SNF. No local regulations related to travel management on the SNF are defined by the Mariposa APCD.

Public Health

Pollutants of Concern

Some of the pollutants regulated under the NAAQ Standards and the CAAS are created by motor vehicles and can cause detrimental effects to public health ecosystems. The air pollutants of concern in this area include particulate matter (PM), ozone (O₃) and nitrogen oxides (NO_x) and natural occurring asbestos (NOA). PM, O₃, NO_x, and NOA may pose a threat to human health and forest ecosystems in the SNF and Sierra Nevada. Some locations due to elevation, topography, geology may pose a greater risk than others.

The San Joaquin Valley Air Basin is in non-attainment for O₃ and PM. As population and temperature increases in California and particularly in the foothills of the Sierra Nevada mountain range, concentrations of O₃, NO_x and possibly PM_{2.5} concentrations are expected to increase.

Particulate Matter (PM)

Particulate matter (PM) in ambient air is composed of complex mixtures of inorganic and organic substances. The mixture is made up of liquid or solid particles suspended in the air. These particles vary in origin, size and composition.

In the regulatory framework PM is divided into fine and coarse particles. Fine particles (PM_{2.5}) are defined as particles with an aerodynamic diameter of less than 2.5 PM. Fine particles are made up of combustion particles and recondensed organic and metal vapors and contain secondarily formed aerosols from gas to particle conversion (Liu and others 2003, Harrison and others 2001, WHO 2003). Coarse particles (PM₁₀) are defined as particles with an aerodynamic diameter between 2.5-10 PM. The coarse particles are mostly composed of crust materials and dust from roads and industries (Liu and others 2003, WHO 2003).

PM comes from a variety of sources. The San Joaquin Valley's sources of PM and PM precursor emissions, coupled with its geography and climate, support the formation and trapping of particulates in the atmosphere. The effects from the resulting PM₁₀ levels in the atmosphere include health hazards to Valley residents (particularly sensitive groups), decreased visibility, and damaged vegetation. Although PM₁₀ levels have decreased substantially in the San Joaquin Valley in the past few years, levels of PM measured in the Valley's atmosphere at some locations still exceed federal standards set to protect public health and welfare. (SJVAPCD, March 2010)

PM₁₀ sources hundreds or even thousands of miles away can contribute to visibility problems at remote locations, such as the Sierra Nevada Mountain Range. Regional haze, haze that impairs visibility in all directions over a large area, consists of sufficient smoke, dust, moisture, and vapor suspended in air to impair visibility. These particles often grow in size as humidity increases,

further impairing visibility. (Valley Air District, March 2010) In the mountains in the west, visual range has decreased from 140 miles to 35-90 miles (EPA, March 2010).

PM HEALTH EFFECTS

Short-term exposure to PM has been associated with negative effects to human health. Long-term exposure to PM is believed to have a much greater impact on human health, but has more uncertainty because less is known about it (Koelemeijer et al. 2006).

There is strong evidence to suggest that PM_{2.5} is more hazardous to human health than PM₁₀ in terms of cardio pulmonary disease and mortality (WHO 2003).

Ozone

First discovered in the 1840s, O₃ was shown to be toxic to animals in the 1870s and to cause crop damage in the 1940s (Carroll et al., 2003). O₃ is produced photo chemically by NO_x (oxides of nitrogen) and VOC (volatile organic compounds) emissions from combustion engines and from some plants in the Sierra Nevada when coupled with strong sunlight and high temperatures (Murphy et al. 2007). Emissions occur in the foothills of the western Sierra Nevada from a dense population of oak trees, and from pines at a higher elevation (Steiner et al. 2008). O₃ exposure in the SNF is higher than in the valley locations (Cisneros and Perez 2007). The increased temperature in this region caused by climate change will create more O₃. There are other factors that are important for local O₃ production in the central valley, including: large-scale meteorology, mixing depths and transport of O₃ formed in other areas such as San Francisco (Steiner et al. 2008).

HEALTH EFFECTS

According to Hayes (1993) a number of health effects have been documented or suspected to occur due to ground level O₃ exposure. Some of the effects were: lung function decrements, airway hyper-reactivity, cell damage and lung inflammation. All are known to occur during the exposure of humans to low levels of O₃.

EFFECTS ON FORESTS AND ECOSYSTEMS

O₃ can also affect forest health and change biodiversity (Bytnerowicz et al. 2002). In the Sierra Nevada Mountains of California atmospheric monitoring suggests that O₃ concentration occurs in doses sufficient to damage pines (Bytnerowicz et al. 2002). Most of the significant injuries continue to be evident in the Sierra and Sequoia National Forests. Ozone also affects the production of chlorophyll. Ozone may be toxic to vegetation at concentration greater than 30 to 40 ppb and the severity of plant damage depends on the characteristics and length of exposure as well as abiotic and biotic factors (Bytnerowicz et al. 2002).

NITROGEN OXIDES (NOX)

Nitrogen oxides form when fuel is burned at high temperatures and come principally from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. Nitrogen oxides can negatively affect aquatic systems, can affect visibility and are a precursor compound to O₃ and to PM_{2.5}.

The primary releases of nitrogen compounds (oxides, ammonium and nitrates) to the air in the natural environment were from microbial activity, lightning and wildfires. The historical levels have almost doubled on a global basis as a result of fossil fuel combustion, animal husbandry practices and fertilization.

EFFECTS ON FORESTS AND ECOSYSTEMS

Nitrogen oxides in the air are a significant contributor to nitrogen deposition which causes a number of environmental effects such as acid rain and eutrophication of lakes. Eutrophication occurs when a body of water suffers an increase in nutrients that reduce the amount of oxygen in the water, producing an environment that is destructive to aquatic life. Even moderate concentrations of NO_x and other nitrogen compounds could contribute substantial amounts of deposited nitrogen to the forests affecting their growth, species composition, surface and groundwater quality (Fenn et al. 2003; Bytnerowicz and Fenn 1996; Tarnay et al. 2001).

NITROGEN DIOXIDE (NO₂)

Health Effects

Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza.

NATURAL OCCURRING ASBESTOS

Natural Occurring Asbestos (NOA) is a generic term for multiple types of naturally-occurring fibrous minerals distributed throughout California. Although chrysotile is the most common form of asbestos, other types (such as amphibole) are also found in California. Chrysotile asbestos is usually found in serpentine rock and its parent material, ultramafic rock, which is located in abundance in the Sierra Nevada foothills, the Klamath Mountains and Coastal Ranges. Additionally, asbestos is commonly found near fault zones. The quantity of asbestos in serpentine and ultramafic rock ranges from less than 1 percent to about 25 percent and occasionally an even higher concentration is found.

Health Effects of NOA

Asbestos fibers may be released from ultramafic and serpentine rock when the rock is broken or crushed; for example, when cars drive over unpaved roads or when land is graded for development purposes, asbestos can be released. Also, it may be released naturally through weathering and erosion. The long, thin fibers may remain airborne for as long as ten days, posing a human exposure hazard. Ambient atmospheric concentrations of NOA vary greatly depending on proximity to a local source.

Most of the scientific data on health effects of asbestos comes from occupational exposure. The challenge is that people who recreate in the forest will most likely be exposed in an episodic manner to very different concentrations of NOA depending on their activity. How and whether this very different non-occupational exposure pattern may alter disease outcomes and latency periods is unknown due to the uncertainty surrounding NOA and the lack of data.

Over the course of several decades, a vast body of asbestos-related research has been conducted in an attempt to characterize the mechanisms of asbestos and how they may depend upon the specific properties of different fiber types. What conclusions may be drawn from the available data remains the subject of much debate (Vu and Lai 1997). Asbestos is known to cause several forms of respiratory disease including asbestosis, mesothelioma and lung cancer (Smith and Wright 1996; Suzuki et al 2005; Stayner et al 1996). What is less clear, however, is the exposure level(s) at which asbestos poses a significant health risk. Although chronic exposure is a primary factor in the development of asbestos-related diseases and tobacco smoke clearly increases risk, it is likely that other unknown factors are involved as well, since individuals with similar exposures do not universally experience similar health effects.

Climate Change

The climate system is often defined as average weather. The climate system is complex and interactive. Climate is usually described in terms of mean and variability of temperature, precipitation and wind over a period of time. The periods of time, range from months to millions of years. The climate system evolves under its own internal dynamics and external factors that affect climate. External factors include human caused changes in atmospheric composition through the increase of green house gases (GHGs) as well as natural events such as solar variations and volcanic eruptions.

The most important GHGs are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), several synthetic halocarbons (chlorofluorocarbons (CFCs), hydrofluorocarbons, perfluorocarbons, halons and sulphurhexafluoride), H₂O (water), O₃ (ozone), and aerosols. The most important GHGs related to motor vehicle travel in this project are CO₂, CH₄, and N₂O.

The Environmental Protection Agency (EPA) (2007) developed a “State of Knowledge” paper that outlines what is known, what is very likely and what is uncertain about global climate change.

The following elements are known about climate change: human activities are increasing the levels of GHGs since pre-industrial times thus changing the composition of Earth’s atmosphere; the buildup of CO₂ and other GHGs are largely due to the burning of fossil fuels; an unequivocal global warming trend of about 1 to 1.7 degrees Fahrenheit occurred from 1906-2005. Green house gases emitted by human activities remain in the atmosphere for periods ranging from decades to centuries, therefore atmospheric concentrations of GHGs will continue to rise over the next few decades; and increasing GHGs concentrations tend to warm the planet.

The following is very likely about climate change: The increase of human caused GHGs concentrations have resulted in most of the observed increase in global average temperatures since the mid-20th century; the average global temperatures and sea levels will continue to rise and precipitation patterns will change as GHGs in the atmosphere continue to rise.

The following is uncertain about climate change: how much and how fast warming will occur; and how warming will affect precipitation patterns and the rest of the climate system.

3.7.2 Affected Environment

Most of the land in the SNF is located in the San Joaquin Valley Air Basin (SJVAB). A small portion of the SNF is located in the Mariposa County which forms part of the Mountain Counties Air Basin. The SJVAB is recognized as one the most polluted areas in the United States. Because of the current situation this area is susceptible to air pollution impacts from different sources. Currently the SJVAB is designated as a non attainment area for O₃ and PM_{2.5} under National and California air quality standards. This has resulted in conservative policies that the Valley Air District uses to protect valley air quality conditions.

The SJVAB is the second largest air basin and represents 16 percent of California’s geographic area basin delineated by the CARB. The population in the SJVAB is expected to reach 4.2 million by 2010, 5.3 million by 2020, 6.5 million by 2030 and 7.9 million by 2040 (California Department of Finance 2007).

There are three Class 1 air sheds protected by the Regional Haze Rule near the project area, They are the Ansel Adams (previously Minarets), John Muir, and Kaiser Wildernesses. Air quality and air quality related value monitoring is ongoing. Visibility in the Ansel Adams and John Muir wildernesses has been monitored since 1991.

Intercontinental Transport

Asian dust has a big impact on air quality on high elevation sampling sites in the western United States (Liu et al. 2003). Significant amounts of the Asian aerosols were observed at high elevation mountain location sites in the western United States which includes a site in the SNF (VanCuren and Cahill 2002; VanCuren 2003; Liu et al. 2003). This is an important factor because it constitutes about 10 percent for PM10 and about 9 percent for PM2.5 of CAAQS. Ozone in air arriving from Asia during the spring time (spring time is the season of strongest transport of Asian emissions) has increased by 10 ppbv or 30 percent since the 1980s (Jaffe et al. 2003).

Existing Condition

Currently part of the SNF is located in an area designated as a non-attainment for O3 and PM2.5 under the national and California air quality standards. Fresno, Madera and Mariposa counties are within the Federal non-attainment area for ozone 8 hour. Fresno and Madera counties are within the Federal non-attainment area for PM2.5. A small portion of the SNF currently under attainment is the north part of the forest located in the Mariposa County and regulated by the Mariposa County APCD.

Motor vehicles (including OHV) emit criteria pollutants such as NOx, SO2, CO and volatile organic compounds (VOCs) (Ouren et al. 2007). Both NOx and VOCs are the precursors for the nonattainment pollutant O3. Motor vehicle exhaust and travel on unpaved roads and trails emits particulate matter. Inhalable coarse particles (PM10) are emitted directly from the source (such as soot from engine exhaust, windblown dusts from bare soil and reentrained dust from vehicle travel on unpaved roads). Fine particles (PM2.5) are associated with the products of engine exhaust including the reaction of NOx with ammonia and diesel soot. Inhalable particulate matter poses a serious health hazard, since it can be deposited in the lungs and can cause permanent damage by interfering with the body's mechanism for clearing the respiratory tract or by acting as a carrier of a toxic substance. Dust from motor vehicle use on unpaved surfaces can directly reduce plant photosynthesis near roads and trails by coating needles and leaves (Ouren et al. 2007). PM2.5 is one of the major causes of reduced visibility in the southern Sierra Nevada, including in National Forest Class I wilderness areas (EPA 2007).

Most of the proposed motorized trails and all of the areas are located in igneous intrusive rocks that do not have occurrences of NOA. There are some proposed motorized trails and areas with low potential for NOA to occur within the project boundary. These areas include ultramafic to mafic igneous intrusive rocks and marble bodies mapped within metamorphic roof pendants. No serpentinite or serpentinized igneous bodies are found within the project area. Only low potential NOA rock bodies intersecting routes in alternatives were identified. The Minerals Resource Data System (MRDS) was evaluated to determine the presence of known asbestos at inventoried mines in the project area (USGS, 2005). Two asbestos mine sites were identified in the MRDS database and are near and within the project area. These two mines are known as the Ralph Hill Mine and a reported mine on Kaiser Ridge. No proposed routes are located at these sites. The Kaiser Ridge mine is located in the Kaiser Peak quadrangle, near Sample Meadow Campground. The Ralph Hill mine is located within 300 feet of the SNF boundary, in the Trimmer quadrangle, near Lakeview Campground and Secata ridge in an undifferentiated metasedimentary unit. Several inventoried, unauthorized routes and proposed motorized trails are located in the same geologic map unit as the Ralph Hill Mine (Gallegos and McGuire 2009, Gallegos 2010). Rock samples from the Ralph Hill Mine were collected and sent to a lab to determine presence of asbestos. The results of the lab testing were negative for asbestos (see geology report). No Open Areas, parking or staging areas proposed in any of the action alternatives were found to be located on potential NOA terrain. Five proposed motorized trails including OHV routes ZZ25, ZZ26, TH-20w, TH-

28z, and TH-29z have been field reviewed and determined to not have NOA along the routes. Therefore, these routes are no longer a concern for potential NOA.

3.7.3 Environmental Consequences

Impacts to Air Quality

The effects of the alternatives are analyzed to determine the potential for public motor vehicle travel to cause or contribute to violations of NAAQs, for degradation of air quality, affect Class I areas or to cause or contribute to visibility impairment beyond the existing conditions. Air quality impacts would be considered significant if they are expected to cause or contribute to an air quality violation in a non-attainment or maintenance area. However, if total direct and indirect project emissions fall below designated applicability threshold levels established under the Conformity Rule, no adverse change in attainment status is expected.

Effects Common to All Alternatives

Direct and Indirect Effects

Based on the four actions 1) prohibition or continued cross-country motor vehicle use, 2) additions to the NFTS, 3) changes to the NFTS, and 4) non-significant LRMP amendments, the number of vehicle miles traveled annually by forest users is not expected to change in any of the alternatives through the prohibition of cross-country travel and the redirection of motor vehicle use onto a designated system of roads, trails and areas.

A summary of proposed additions to the NFTS for Alternatives 2, 3, 4 and 5 is listed below in Table 3- 48. Some of the miles added will require mitigation and/or design feature work. Under Alternative 1, 605,000 acres of SNF lands would remain open to motorized cross-country travel. NFTS road and trail miles and acres of areas will increase under Alternatives 2, 4 and 5; no additional miles or acres of NFTS would be made available in Alternative 3. Releases of PM10/PM2.5 into the environment occur from motor vehicle travel on NFTS roads and trails and from some associated prescriptive actions. Tailpipe emissions from motorized equipment will produce criteria pollutants such as CO, as well as the precursor gases for O3 and PM2.5.

No new visits per year are projected under each of the action alternatives. Thus it will not affect the number of vehicle miles traveled (VMT) annually within the study area.

Table 3- 48. Proposed Additional NFTS Miles per Alternative

	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Additional miles (roads and trails) available for motorized use	44	0	51	85

Criteria pollutant emissions from recreational vehicle use (which includes both engine exhaust and fugitive dust) are expected to stay the same for all action alternatives.

Mitigation and design feature activities will include road and trail bed work using heavy equipment and fencing or blocking of some unauthorized routes. The use of heavy equipment and worker vehicles will produce exhaust emissions, while travel on unpaved roads will produce fugitive dust. Insignificant increases in short-term, localized emissions will occur under each action alternative during these activities.

Because the criteria pollutant emissions are projected to remain the same as current conditions under all alternatives there will be no increase in emissions due to the project. Therefore the project is below the de minimis levels and is exempt from the requirement to perform a conformity determination.

Cumulative Effects

Potential cumulative impacts of the proposed project in conjunction with other past, present or reasonably foreseeable probable actions are the focus of this section. The actions analyzed for potential cumulative impacts include activities listed in Appendix E. The project is expected to have limited cumulative impacts to air quality. Road and trail maintenance will create small localized, temporary increases in fugitive dust and emissions from motorized equipment. Overall, Alternatives 1 through 5 will not impact air quality since the implementation of any alternative will not change the amount of vehicle miles traveled.

CO₂, CH₄ and N₂O emissions generated by public motor vehicle travel on NFTS facilities are expected to contribute to the global concentration of greenhouse gases that affect climate change. The intensity and severity of these effects are expected to vary regionally and even locally, making any discussion of potential site-specific effects of global climate change on forest resources speculative.

Because GHGs from vehicle emissions mix readily into the global pool of GHGs, it is not currently possible to discern the effects of this project from the effects of all other GHG sources worldwide, nor is it expected that attempting to do so would provide a practical or meaningful analysis of project effects. Potential regional and local variability in climate change effects add to the uncertainty regarding the actual intensity of this project's effects on global climate change. Further, emissions associated with this project are extremely small in the global atmospheric CO₂ context, making it impossible to measure the incremental cumulative impact on global climate from emission associated with this project. In summary, the potential for cumulative effects is considered negligible for all alternatives because none of the alternatives would result in measurable direct and indirect effects on air quality or global climatic patterns.

Impacts to Public Health from Natural Occurring Asbestos

Direct, Indirect and Cumulative Effects

Alternative 1

Continued use and proliferation of the unauthorized routes that are underlain with potential NOA terrain would be open and available for motor vehicle travel. There is a low potential for NOA to occur in the project area and along these routes, because NOA is known to occasionally occur in similar geology. If NOA is present along any of these routes, it will occur in short, discrete sections along the routes. The exposure of NOA to the public will be minimal if at all, therefore the public health risk is low to no risk from NOA. See Table 3- 49 and Table 3- 50 for a summary of proposed trails with potential NOA by alternative and a list of proposed motorized trails.

Alternative 2, 4 and 5

Twelve motorized trails proposed in Alternatives 2, 4 and 5 are identified as having a low potential for NOA (see Table 3- 50). There is a low potential for NOA to occur in the project area and along the twelve proposed motorized trails. If NOA is present along any of these proposed trails, it will occur in short, discrete sections along the trails. The exposure of NOA to the public will be minimal. These twelve proposed motorized trails will have a level 1 geologic

assessment for Natural Occurring Asbestos (NOA), prior to being added to the NFTS. If any of these routes are found to have NOA on or adjacent to the trail, mitigation and a human health assessment will be conducted prior to adding to the NFTS. Alternatives 2, 4 and 5 have eight proposed motorized trails with potential NOA that total 2.9 miles, 3.4 miles, and 3.4 miles, respectively.

Alternative 3

There will no direct, indirect or cumulative effects to public health from exposure to NOA because there are no proposed additions to the NFTS and cross-country travel will be banned.

Table 3- 49. Summary of Inventoried, Unauthorized Routes in Potential NOA Terrain

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Number of Routes in potential NOA terrain	152	8	0	8	8
Miles	43.2	2.9	0	3.4	3.4

Table 3- 50. Unauthorized Routes Located in Potential NOA Terrain, by Alternative

Route	Length	Alt 2	Alt 4	Alt 5
KD-219	0.29	Y	Y	Y
KD-220	0.05	Y	Y	Y
TH-145z	0.34		Y	Y
TH-146z	0.04		Y	Y
TH-3y	0.79		Y	Y
TH-41y	0.65	Y	Y	Y
TH-67y	1.08	Y	Y	Y
TH-7y	0.19		Y	Y
KD-197	0.10	Y		
KD-218	0.05	Y		
TH-25w	0.25	Y		
TH-97	0.43	Y		

3.8 Soil Resource

3.8.1 Introduction

A healthy and functional watershed relies on an equilibrium, or balance, in the soil productivity, soil quality, water quantity and water quality. The soil resource provides many essential functions for NFS lands. It sustains plant growth that provides forage, fiber, wildlife habitat and watershed protection. It absorbs precipitation, stores water for plant growth and gradually releases surplus water which attenuates runoff rates. It sustains microorganisms which recycle nutrients for continued plant growth. The National Forest Management Act of 1976 and other acts recognized the fundamental need to protect and, where appropriate, improve the quality of soil.

Protection of the soil resource is an important part of the mission of the Forest Service. Management activities on NFS lands must be planned and implemented to protect soil quality and the hydrologic functions of forest watersheds. The use of roads, trails and other areas on National Forests for public operation of motor vehicles has potential to affect the soil resource through interception of runoff, compaction of soils and detachment of sediment (Foltz, 2006). Management decisions to eliminate cross-county motorized travel, add new routes and areas to the NFTS and make changes to the existing NFTS must consider effects on soils and watersheds.

Analysis Framework: Statute, Regulation, LRMP and Other Direction

Direction relevant to the alternatives as they affect the soil resource includes the following:

National Forest Management Act of 1976: Renewable Resource Program “(C) recognize the fundamental need to protect and where appropriate, improve the quality of soil, water and air resources.”

National Soil Management Handbook: The Soil Management Handbook (USDA-FS 1991b) is a National soils handbook that defines soil productivity and components of soil productivity, establishes guidance for measuring soil productivity and establishes thresholds to assist in National Forest planning.

Pacific Southwest Region Soil Management Handbook Supplement: The Forest Service Pacific Southwest Region Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1) establishes regional soil quality analysis standards. The analysis standards address three basic elements for the soil resource: (1) soil productivity (including soil loss, porosity and organic matter), (2) soil hydrologic function and (3) soil buffering capacity. The analysis standards are to be used for areas dedicated to growing vegetation. They are not applied to lands with other dedicated uses, such as developed campgrounds, administrative facilities or in this case, the actual land surface authorized for travel by the public using various kinds of vehicles.

Regional Forester’s Letter (dated Feb 5, 2007): This letter provided clarification to Forest Supervisors on the appropriate use of the Pacific Southwest Region Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1). It states in part:

“Analysis or evaluation of soil condition is the intended use of the thresholds and indicators in Pacific Southwest Region FSH Supplement 2509.18-95-1. They are not a set of mandatory standards or requirements. They should not be referred to as binding or mandatory requirements in NEPA documents. Standards and guidelines in Forest Land and Resource Management Plans provide the relevant substantive standards to comply with NFMA.

The thresholds and indicators represent desired conditions for the soil resource. Use of the thresholds and indicators provides a consistent method to analyze, describe and report on soil condition throughout the region.”

LRMP Soils Standards and Guidelines for General Forest

The LRMP provides for management standards and guidelines to all management areas and analysis areas or aggregates of analysis areas (USDA-FS 1991). These standards and guidelines (S&G) are as follows:

1. Improve water quality and protect soil productivity by restoring deteriorated watersheds on the basis of economic efficiency and severity of problems and its impact on downstream beneficial uses (see LRMP S&G 122).
2. Apply appropriate erosion prevention measures on all ground disturbing activities (FSH 2409.23) prior to fall storms (October 1) and immediately upon completion of activity begun after November 1 (see LRMP S&G 127).
3. Apply appropriate erosion prevention measures on high erosion hazard soils under the following conditions: (see LRMP S&G 128).
 - a. When exposed soils from an average of several 500-foot linear transects:
 - i. Exceed 150 feet on slopes of 15-35 percent,
 - ii. Exceed 75 feet on slopes 35-65 percent,
 - iii. Exceed 25 feet on slopes over 65 percent,
 - b. On linear disturbances, such as skid trails and fire lines, cross-drain area at the following intervals:

Interval between Cross-Drain (feet)

Percent Slope	HEHR	VHEHR
0-15	150	125
15-35	75	45
35-65	35	20
65+	15	15
HEHR – High Erosion Hazard Rating VHEHR – Very High Erosion Hazard Rating		

4. Road construction on areas with High and Very High Erosion Hazard will follow standards in FSM 2521 Sierra Supplement No. 8, which gives direction concerning stabilization and road surface drainage (see LRMP S&G 129, USDA-FS 1991 and LRMP Letter of Clarification, USDA-FS 2009).

Effects Analysis Methodology

Soil quality effects analysis was based on identifying areas of risk on the SNF. The analysis used GIS and the published Order 3 Soil Resource Inventory (SRI) to rank proposed unauthorized routes by erosion potential (Giger and Schmitt, 1993).

An analysis of soil data was conducted on all unauthorized routes to determine erosion hazard rating, sensitivity and hydrologic function. This analysis resulted in a soil risk assessment that identified routes that are most susceptible to erosion and have the highest potential for degraded soil productivity. The results of this assessment were to determine which routes did or did not

need to be reviewed in the field. The assessment assigned a rating of 1 to 5 based on the following criteria:

1. The unauthorized route was considered; a field visit is not necessary; the effects of adding the route to the NFTS will not be adverse assuming routine maintenance.
2. The unauthorized route was considered, a field visit was made and the effects will not be adverse assuming routine maintenance.
3. The unauthorized route was considered, a field visit was made and site specific mitigation is prescribed to reduce the effects to less than adverse.
4. The unauthorized route was considered, a field visit was made and a determination was made that the effects would be adverse. The route is not recommended by the specialist for inclusion.
5. The unauthorized route was considered, more information is needed to make a determination.

This assessment was used to prioritize field review. The following is a description of the methodology and assumptions:

1. Maximum Erosion Hazard Rating (MEHR), soil texture and rock fragments were tabulated from the Order 3 SRI.
2. Unauthorized routes with high gradients (>15 percent grade) and high or very high MEHR were considered high risk, assuming routine maintenance.
3. Unauthorized routes with lower gradients and moderate MEHR were considered low risk, assuming routine maintenance.
4. Unauthorized routes with higher gradients and high or very high MEHR were considered high risk. These routes were further evaluated by GIS and field work to determine potential for adverse effects such as loss of water control on roads and trails. A secondary indicator, Hydrologic Function Class (HFC) was used to predict where some roads may be sensitive to damage and loss of hydrologic function. HFC was used as a tool for prioritizing field work and as an indicator to compare alternatives. The red/yellow/green monitoring criteria was used to evaluate the observed conditions and to validate the initial office GIS risk assessment.
5. Unauthorized routes were evaluated for surface condition using a green, yellow, red surface condition class and to validate the initial office GIS risk assessment. Green condition class indicates a trail in good condition with little sign of erosion. Yellow condition class indicates a trail segment that is experiencing some erosion because cross ditches are only partially functional or there is an insufficient frequency of cross ditches per linear distance along the trail. Red condition class indicates a trail segment that is eroding severely and the cross ditches are not functioning.
6. Unauthorized routes in a red condition class or have a high potential for adverse effects (surface erosion and loss of water control) were considered for mitigation or were not eligible to be brought into the NFTS. Mitigation was documented by route. See Appendix A for specific mitigation measures for routes. Where unauthorized routes were recommended as not eligible to be brought into the NFTS, site-specific concerns were given.
7. Parking/staging areas and areas have similar effects to soil resources.

8. In summary, unauthorized routes were initially reviewed to determine if the soil that the route is located on is considered sensitive. Unauthorized routes on non-sensitive soils were given a rating of 1 and were considered not to need a field review from a soil resource perspective. Unauthorized routes located on sensitive soils were field reviewed and based upon a field review were given a rating of 2, 3 or 4. Further analysis of the routes and soils determined the soil Hydrologic Function Class according to the ranking criteria. The HFC class is used to determine the potential effects on the proposed routes to the soil resource.

Data Sources

1. Route specific data collected in the field using established protocols for road erosion inventories and motor vehicle red/yellow/green inventories (see project record OHV Route Evaluation Forms).
2. Inventoried routes identified in Alternatives 2, 4 and 5 and provided in GIS spatial form and associated tabular data sets.
3. SNF soil survey GIS spatial form and associated tabular data sets.
4. Assessment for passive recovery of routes closed to motor vehicle traffic (Rojas 2008). Passive recovery of trails was determined based on soil productivity and vegetation of the surrounding area. Trails with highly productive, deep soils with bear clover are estimated to recover within 5 years. Trails with shallow soils and rock outcrop with little vegetation could take 15 to 50 years to recover.

Soil Resource Measurement Indicators

- Miles of unauthorized routes displayed by MEHR (as defined by the R-5 Maximum Erosion Hazard Rating).
- Miles of unauthorized routes displayed by Hydrologic Function Class (HFC).

The indicator, HFC is a soil hazard interpretation that predicts where roads and trails are prone to failure of drainage structures. HFC is a function of mechanical rutting potential, erosion potential and loss of water control. Some roads are more sensitive to damage of the road surface from rutting, erosion and loss of water control. Soil engineers may state this as a loss of hydrologic function. In extreme cases a loss of the facility is possible. HFC is based on soil properties, including soil texture and coarse fragment content, that determine how a native surface road or trail will mechanically rut and erode with traffic. HFCs are adapted from the FS Pacific Southwest Region Soil Interpretations (USDA-FS 1999a). HFC is a filter or method to predict weak areas in a transportation system that may require a higher level of maintenance, mitigation and in some cases a recommendation to close the facility.

Classes and soils are described below:

- *Mechanical Rutting and High Erosion* is most prevalent on soils that are considered sensitive on the SNF. Sensitive soils include Holland family, Auberry family and Ultic Haploxeralfs and are known to rut and erode easily. These soils have argillic or clay loam subsoils that are highly susceptible to rutting and erosion when exposed and wet. If these soils are used under wet conditions, cross drain features such as water bars are easily breached and erosion can develop into severe gully erosion. High erosion potential is greater on unauthorized routes with steep gradients (16 to 25 percent) and very steep gradients (26 percent and higher) (See Table 3- 51).

Table 3- 51. Hydrologic Function Class – Susceptibility to Mechanical Rutting and High Erosion

Factors Affecting	Slight	Moderate	Severe
Soil texture of family particle size control section	COSL and coarser Coarse Textured Sandy Loams	L, SL, FSL, SIL, VFSL Medium Textured Loams	C, SIC, SC, CL, SICL, SCL Fine Textured Clay Loams
Coarse fragments (percent) by volume	>25	10 - 25	<10
MEHR	Moderate or less	High	Very High

COSL- coarse sandy loam; L- loam; SL- sandy loam; FSL- fine sandy loam, SIL- silty loam; VFSL-very fine sandy loam; C-clay; SIC- silty clay; SC- sandy clay; CL- clay loam; SICL- silty clay loam, SCL sandy clay loam.

GIS was used to sort route segments that have mechanical rutting and erosion concerns based on the above hazard classes. The hazard classes are not hypothetical; they were verified by field observation.

Soil Resource Methodology by Action

The analysis methodologies for each of the four actions that make up the alternatives and cumulative effects of the actions are described below.

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

The prohibition of cross-country travel is focused on the effects from unauthorized use. Considerations and the indicators of effects are given below:

Indicator(s): Miles of unauthorized routes displayed by (1) MEHR and (2) HFC. Both indicators are a soil hazard interpretation that ranks miles of route by potential for erosion and loss of water control. The assumption is that effects are related to the miles roads, trails and areas proposed to be closed by prohibiting cross-country travel. It is also assumed that unauthorized routes will passively recover.

Direct Effects from unauthorized use: Generally for the existing unauthorized routes, direct effects have already occurred. The direct effects were: physical displacement of soil caused by unauthorized motor vehicle traffic; loss of soil productivity from the displacement and loss of soil depth; loss in soil hydrologic function due to loss of soil and loss of soil cover.

Indirect Effects from unauthorized use: The removal of vegetation and exposure of soil in unauthorized routes and areas will result in erosion. These unauthorized routes and areas were not designed and have no runoff water control to protect the soil resource. Accelerated erosion is occurring on several unauthorized routes and off the routes to the point that soil surface horizons have been destroyed and soil productivity has been lost. Further loss of productivity will occur and diminished hydrologic function. A loss of water control and accelerated erosion on the un-maintained trail is an indirect effect.

Methodology: Unauthorized routes open for motor vehicle use are compared to GIS layers displaying MEHR and HFC.

Short-term time frame: The 1-year time frame looks at routes over the short-term. It does not provide time for passive recovery on closed routes.

Long-term time frame: The 20-year time frame looks at routes over the longer term. It provides time for passive recovery on closed routes. Passive recovery is assumed to be a benefit. Factors such as soil type, precipitation and temperature affect rates of vegetative recovery.

Spatial boundary: Project Area (see Figure 1-2).

Rationale: General guidelines in the National Soil Management Handbook and Pacific Southwest Region Soil Management Handbook Supplement.

2. Direct and indirect effects of adding facilities (presently unauthorized roads, trails and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

The effects of adding facilities are focused on presently unauthorized roads, motorized trails, areas proposed to be added to the NFTS. This is a change from unauthorized and un-maintained to NFTS status. Considerations and the indicators of effects are given below:

Indicators: Miles of unauthorized routes added to the system displayed by MEHR and HFC.

Direct Effects: Generally, past direct effects have occurred from soil displacement caused by the unauthorized use. Direct effects could continue to occur. These direct effects result in a loss of soil productivity from the displacement and loss of soil depth and a loss in soil hydrologic function due to loss of soil and loss of soil cover. The assumption is that these past direct effects are related to total miles of routes converted from unauthorized to NFTS status.

Indirect Effects: Indirect effects to the soil resource from the addition of a previously unauthorized route to the designated system will be dependent upon what soil type the route is located on, its erosion potential and HFC and various factors associated with the routes, such as slope. Additional water runoff control (dips, cross ditches, etc.) measures may be needed to avoid indirect effects before authorized use can be allowed. The degree of indirect effects will be dependent on whether water control measures will be implemented or the effectiveness of the water control measures. Indirect effects occur later in time and/or offsite. Examples of indirect effects are uncontrolled runoff causing erosion down slope of the trail or sediment generated from erosion of a trail depositing in channel.

Field observations of soil response are used to formulate the expected direct, indirect and cumulative soil effects for each alternative.

Methodology: Unauthorized routes and areas were located by TEAMS. TEAMS is a Forest Service Enterprise Unit that was utilized to locate and GPS unauthorized routes. Unauthorized routes added to the system are compared to GIS layers displaying MEHR and HFC. Routes are compared with zones of varying erosion potential risk.

Short-term time frame: The 1-year time frame looks at routes over the short-term. It does not provide time for passive recovery on closed routes.

Long-term time frame: The 20-year time frame looks at routes over the longer term. It provides time for passive recovery on closed routes. Passive recovery is assumed to be a benefit. Factors such as soil type, precipitation and temperature affect rates of vegetative recovery.

Spatial boundary: Project Area (see Figure 1-2).

Rationale: Analysis guidelines in the National Soil Management Handbook and Pacific Southwest Region Soil Management Handbook Supplement.

3. Changes to the existing NFTS (changes to vehicle class, season of use and opening or closing roads).

Changes to existing NFTS include (1) closed to open; (2) open to closed; (3) changes in vehicle type and season of use. Considerations and the indicators of effects are given below:

Indicator(s): Miles of NFTS roads or trails (closed to open/open to closed) displayed by (1) MEHR and (2) HFS. The indicators are a soil hazard interpretation that ranks miles of route by potential for erosion and loss of water control.

Direct Effects: The important effects are those focused on existing NFTS (closed to open/open to closed) roads. These are maintenance level 1 and 2 roads that change in status from (open to closed) or (closed to open) under action alternatives. Opening maintenance level 1 and 2 roads poses a higher risk of causing negative soil effects compared with the effects of closing routes or the effects of changing vehicle type. The use of roads that were previously closed disturbs and loosens soil on the road surface and subsequent rainfall subjects the disturbed soil to erosion. The assumption is that a change in vehicle type will either keep the existing road width the same or the road will eventually narrow if used by ATVs or motorcycles. A change in vehicle type only would represent no increase of soil or land area for routes.

Indirect Effects: An action alternative may place control on the season of use for an area. This will generally have a positive indirect effect because it will reduce damage to the facility tread and its erosion control structures during the most susceptible time of the year. Placing control on the season of use will reduce the risk but not eliminate erosion to soil down slope.

Methodology: GIS analysis to compare the location of the trail/roads in each alternative with the zones of varying erosion potential risk. Field observations of soil type response formulate the discussion of expected effects for each alternative.

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: Project Area (see Figure 1-2).

Rationale: Analysis guidelines in the National Soil Management Handbook and Pacific Southwest Region Soil Management Handbook Supplement.

4. Non-Significant LRMP Amendments

As explained in section 3.1.1 the non-significant LRMP amendments do not have unique effects when compared to the other actions analyzed in this FEIS. Therefore the environmental consequences have been analyzed and will not be discussed further in the soil resource section.

5. Cumulative Effects

Cumulative soil effects have been addressed under the cumulative watershed effects (CWE) section under the water resources section. Analysis of cumulative soil effects use the Equivalent Roaded Acre (ERA) Model, which is used in the CWE analysis. The ERA model quantifies disturbance based on the degree of disturbance as compared to an acre of road and measured relative to disturbance in a given watershed. ERAs reflect changes to Soil Hydrologic Function and are an indicator of rutting potential, erosion potential and loss of water control. See the CWE analysis description in the Water Resources section for a full description of assessment and assumptions, including a list of past, present and future foreseeable actions. The FS Pacific Southwest Region methodology is used to determine the overall disturbed footprint. The disturbed footprint is a semi-quantitative measure of acres of detrimental soil disturbance and

hence an approximation of change in Soil Quality as defined by the Pacific Southwest Region Soil Quality Standards (USDA 1995a).

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: The long-term time frame used for Cumulative Watershed Effects is 30 years. Thirty (30) years has been determined to be the average amount of time for disturbed soils to fully recover from a hydrologic standpoint. See Cumulative Watershed Effects Analysis in the Water Resource section of this report.

Spatial boundary: The analysis area is by Hydrologic Unit Code (HUC) HUC 8 subdrainage area within the Project Area (see Figure 1-2). The Sierra National Forest is divided and sub-divided into successively smaller hydrologic units which are classified into eight levels. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of 2 to 16 digits based on the 8 levels of classification in the hydrologic unit system. The HUC 8, subdrainage level is the smallest drainage area delineated on the Sierra National Forest.

Indicator(s): (1) Cumulative effects on soil productivity from unauthorized routes and areas (No Action); (2) Cumulative effects on soil productivity from unauthorized routes and areas that are expected to recover (in the given long-term analysis time period) after cross-country prohibition is implemented; (3) Cumulative effects on soil productivity from unauthorized routes and areas that are not expected to recover passively (in the given long-term analysis period) after a cross-country prohibition is implemented; (4) Cumulative effects on soil productivity from implementation of the particular travel system for each alternative.

Methodology: Utilize observations and understanding of short-term effects to soil productivity to estimate long-term expected cumulative effects on soil productivity. Utilize the ERA analysis as a semi-quantitative measure of acres of detrimental soil disturbance and hence an approximation of change in Soil Quality.

Rationale: Analysis guidelines in the National Soil Management Handbook and Pacific Southwest Region Soil Management Handbook Supplement.

3.8.2 Affected Environment

Current management consists of managing off-highway use as determined by the Forest Supervisor in April 1977 (USDA-FS 1977a). This decision was implemented by Forest Order 15-77-3. The plan identified areas where motorized travel was prohibited or motorized travel was restricted to designated routes. On the SNF these areas can be described as lands approximately below 6800 ft in elevation. In this alternative, 605,000 acres of National Forest System lands would remain open to motorized cross-country use. Current management of the NFTS roads is defined under the SNF 1999 Road Closure Plan and implemented by Forest Order R5-83-3.

No changes would be made to the current NFTS and no cross-country travel prohibition would be put into place. The Travel Management Rule would not be implemented and no MVUM would be produced. Motor vehicle travel by the public would not be limited to designated routes, except within areas described in the 1977 ORV Plan. Unauthorized routes would continue to have no status or authorization as NFTS facilities.

The SNF has a high diversity of soil types. Elevation and geology control patterns of soil at the landscape scale. Elevations range from 3,000 to 6,800 feet within the footprint of the proposed actions. Soils are formed from granitic, volcanic and meta-sedimentary parent materials. There

are approximately 550 miles of unauthorized motorized trails that are not part of the NFTS of trails that are underlain with 27 soil types, including rock outcrop, that combine into 75 soil map units. The 10 most dominant soil map units affected by the project are described in Table 3- 52.

Table 3- 52. Ten Most Dominant Soil Map Units Affected by Unauthorized Motorized Routes

Soil Map Unit	Soil Map Unit Name
139	Holland-Chaix families complex, 35 to 65 percent slopes
137	Holland Family, 35 to 65 percent slopes
140	Holland-Chawanakee families complex, 35 to 65 percent slopes
136	Holland family, 5 to 35 percent slopes
113	Cagwin Family-Lithic Xeropsamments-rock outcrop complex , 15 to 45 percent slopes
161	Sirretta Family and Umpa family, wet, 2 to 25 percent slopes
126	Chawanakee Family-Rock Outcrop complex, 35 to 65 percent slopes
138	Holland-Chaix families complex, 5 to 35 percent slopes
120	Chaix Family, deep, 5 to 45 percent slopes
143	Ledford Family-Entic Xerumbrepts-Rock Outcrop association, 10 to 45 percent slopes

The sensitive soil types that would be affected by the proposed motorized trails are described in Table 3- 53. Sensitive soils include Holland family, Auberry family and Ultic Haploxeralfs. A full description of these soils can be found in the Order 3, Soil Survey of the SNF (Giger and Schmitt 1993).

These are sensitive soils that rut and erode easily and are prone to a loss of water control and soil hydrologic function. These soils have an argillic (clay) subsoil, that when exposed to rainfall and runoff can develop accelerated erosion in the form of severe gully erosion. Unauthorized motorized trails are difficult to maintain when used during wet weather conditions, because cross drain structures, such as water bars can be breached. As shown in Table 3- 53, there is a total of approximately 194.65 miles of unauthorized motorized trails that are located on soil map units with sensitive soil types. Some of these soil map units consist of multiple soils types that are not considered sensitive.

Table 3- 53. List of Sensitive Soil Map Units and Unauthorized Motorized Routes

Soil Map Unit	Soil Map Unit Name	Route (mi)
136	Holland family, 5 to 35 percent slopes	38.3
140	Holland-Chawanakee families complex, 35 to 65 percent slopes	31.7
141	Holland-Chawanakee families-rock outcrop complex, 15 to 35 percent slopes	20.8
137	Holland Family, 35 to 65 percent slopes	19.9
139	Holland-Chaix families complex, 35 to 65 percent slopes	17.4
138	Holland-Chaix families complex, 5 to 35 percent slopes	13.6
142	Holland-Neuns families association, 15 to 45 percent slopes	11.2
171	Ultic Haploxeralfs-Dystric Lithic Xerochrepts complex, 15 to 50 percent slopes	7.5
108	Auberry-Ahwahnee Families association, 35 to 65 percent slopes	5.0
124	Chaix-Holland Families complex, 15 to 35 percent slopes	4.4
110	Auberry-Tollhouse Families-rock outcrop association, 25 percent slopes	4.3
107	Auberry-Ahwahnee Families Association, 5 to 35 percent slopes	4.0
173	Ultic Haploxeralfs-Dystric Lithic Xerochrepts complex, 50 to 85 percent slopes	3.2
171	Ultic Haploxeralfs, deep, 15 to 50 percent slopes	2.6
127	Coarsegold-Auberry Families association, 35 to 65 percent slopes	2.6
125	Chaix-Holland families complex, 35 to 65 percent slopes	2.6
105	Auberry Family, 5 to 35 percent slopes	1.7
106	Auberry Family, 35 to 65 percent slopes	1.7
130	Dystric Lithic Xerochrepts-Ultic Haploxeralfs-rock outcrop association, 50 to 80 percent slopes	1.6
128	Coarsegold-Auberry Families-rock outcrop association, 35 to 85 percent slopes	0.8
109	Auberry Family-Rock Outcrop complex, 35 to 75 percent slopes	0.02
Total (miles)		194.9

Affected Environment by Analysis Unit

The soil resource affected environment is described by 10 analysis units that include: South Fork, Westfall, Globe, Mammoth, Gags, Jose-Chawanakee, Dinkey-Kings, Stump Springs-Big Creek, East of Kaiser Pass, and Tamarack-Dinkey (see Figure 3 in Chapter 2 for map of analysis units).

South Fork

There is a total of 22.5 miles of unauthorized routes in the South Fork analysis unit. Approximately 20.34 miles of unauthorized motorized trails are located on sensitive soils. These routes all have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Westfall

The Westfall analysis unit has approximately 112.59 miles of unauthorized routes. Approximately 84.1 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential. Monitoring of the Miami Motorcycle Trail Network for erosion and surface condition was conducted on 24.3 miles of motor vehicle trails in June, 2000. The results of the monitoring found

16 percent of the trails in a red surface condition class, 25.4 percent in a yellow surface condition class and 58.6 percent in a green surface condition class. Recommendations in this monitoring report include rerouting trail segments in a red surface condition class to more gentle and less erosive terrain (Roath 2000).

Globe

The Globe analysis unit has approximately 65.15 miles of unauthorized routes. Approximately 2.6 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Mammoth

The Mammoth analysis unit has approximately 38.59 miles of unauthorized routes. Approximately 15.86 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Gaggs

The Gaggs analysis unit has approximately 82.91 miles of unauthorized routes. Approximately, 20.90 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Jose-Chawanakee

The Jose-Chawanakee analysis unit has approximately 21.57 miles of unauthorized routes. Approximately, 14.77 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Dinkey-Kings

The Dinkey-Kings analysis unit has approximately 60.84 miles of unauthorized routes. Approximately, 32.65 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Stump Springs-Big Creek

The Stump Springs-Big Creek analysis unit has approximately 18.07 miles of unauthorized routes. Approximately, 3.29 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

East of Kaiser Pass

The East of Kaiser Pass analysis unit has approximately 20.90 miles of unauthorized routes. Approximately, 0.14 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Tamarack-Dinkey

The Tamarack-Dinkey analysis unit has approximately 108.61 miles of unauthorized routes. There are no sensitive soils in the Tamarack-Dinkey analysis unit. The Bald Mountain OHV area is located within the Tamarack-Dinkey analysis unit. Monitoring of the Bald, Brewer and Spanish OHV Trail Network for erosion and surface condition was conducted on 21.2 miles of motor vehicle trails in October, 2002. The results of the monitoring found 99 percent of the trails in a Green Surface Condition Class in the Brewer Area, 95.1 percent in a Green Surface Condition Class and 4.9 percent in a Yellow Surface Condition Class in the Spanish Area. Recommendations in this monitoring report include limiting multiple trails and cross ditching (Roath 2002).

3.8.3 Environmental Consequences

Effects Analysis

The principal concern or effect to be assessed for the soil resource is the potential for soil erosion and indirect effects on soil productivity or the ability of the soil to produce vegetation.

Secondary effects from erosion are the loss of soil depth, infiltration capacity and permeability or reduction in the soil hydrologic function.

The effects analysis for the soil resource should focus on the risk of soil erosion from trail/road runoff water to the soil next to or down slope.

Soil Productivity

The erosion that may occur from NFTS trails or road surfaces is a concern regarding loss or degradation of the facility, but not a particular concern for the soil resource, because the route surface is a dedicated use and no longer dedicated to growing vegetation. Basically, soil productivity is not a particular concern 1) if an unauthorized route is converted to a system route (NFTS); or 2) if the unauthorized route is closed and re-vegetated (passive recovery). There is a positive effect to closure of unauthorized routes, in that they passively recover, soil productivity is returned to these sites and accelerated erosion is reduced.

Alternative 1 – No Action

Alternative 1 continues the prohibition of motorized cross-country travel where motorized travel was prohibited or motorized travel was restricted to designated routes and adds no new NFTS facilities. Alternative 1 allows motorized cross-country travel in areas on the SNF, outside those areas where motorized travel was prohibited or motorized travel was restricted to designated routes.

Direct and Indirect Effects

Under this alternative there is concern for the soil resource for 38.5 miles of unauthorized routes that have a were given a soil rating of 3 and 4 out of 106 miles assessed. See effects methodology section for a description of the rating system. This is not all of the inventoried unauthorized motorized trails. There are 8.5 miles of unauthorized routes with a 4 rating and at least 50 percent of the route with a red rating using the green, yellow, red soil monitoring rating system. These routes have severe gully erosion and in several cases there is a bypass route to the motorized trail. The routes with a 3 rating have at least 50 percent of the route with a yellow rating and a portion of the route with a red rating. The routes with a 3 and a yellow rating are in critical need of

erosion control measures to prevent the routes from going into a red category. In the Miami Creek area, it was estimated over an 11 year period between 1989 and 2000 that there was an increase of 0.5 miles of unauthorized motorized trails (Roath 2000). Over a 20-year period, using the value found during the 11-year monitoring interval between 1989 and 2000, there could be an increase of at least 10 miles of motor vehicle trails in the Miami Creek area. Unauthorized motorized trails in the other analysis areas would also increase. Passive recovery of the unauthorized motorized trails will not occur. Unrestricted use of these unauthorized motorized trails and continuance of cross-country travel will not meet soil standard and guidelines.

There are over 243 acres of inventoried and GPS, unrestricted areas that will continue to be used and enlarged by the motorized recreation community. This could result in degradation of the soil resource and loss of soil productivity. These areas will not meet soil standard and guidelines. Unauthorized routes and areas were located using GPS by TEAMS.

There are approximately 574 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

The CWE (Gallegos 2009) analysis established that existing past impacts had raised some subdrainages to percent ERAs levels that exceeded their respective lower Threshold of Concern (TOC) ERA value and above the upper TOC ERA value. The CWE assessment evaluated 487 HUC 8 subdrainages over the area where unauthorized motorized trails occurred. There are a total of 534 channel crossings, within 25 subdrainages, associated with unauthorized motorized trails proposed in this alternative. Fifteen subdrainages have a low potential for CWE, five subdrainages have a moderate potential for CWE and five subdrainages have a high potential for CWE. See Water Resources, Cumulative Watershed Effects (CWE), Alternative 1 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Alternative 2 – Proposed Action

The proposed action is comprised of the prohibition of cross-country motorized travel, the proposed changes to the existing NFTS and the additions to the NFTS as described in the NOI published September 11, 2007 (Volume 72, Number 175) with some modifications (See Chapter 2).

Direct and Indirect Effects

Under this alternative, 4.58 miles of proposed motorized trails that will be included in the NFTS were given a soil rating of 4 and at least 50 percent of the proposed trail has a red rating using the green, yellow, red soil monitoring rating system. The trails will be difficult to maintain and there is a high likelihood that the design and mitigation measures will not be effective due to the sensitivity of the soils. These trails will be closely monitored to ensure effectiveness of the measures and to determine if the trails should stay on the NFTS trail system. These proposed trails were given a soil rating of 4, because a determination was made that the effects could be adverse. The adverse affect will be short-term and will not be permanent or irretrievable. These trails are included in the proposed action even though they have a soil rating of 4, because of the assurance of close monitoring and the ability to remove the trails off the NFTS trail system, if an adverse effect occurs. This decision could be made after the 5th year of monitoring. These proposed trails have severe gully erosion on trail gradients that range from 25 to 35 percent, and in several cases there is a bypass route to avoid the gully. These proposed trails would be

mitigated by: re-aligning the trail, within 15 meters (49 feet) of centerline; restoring the old trail by regrading; tread hardening; erosion control; stream crossing structures; seasonal restriction; installation of barriers; and monitoring. See Table 3- 54 and Appendix A for list of design features and mitigation measures applied to each proposed trail. It is unknown how effective the mitigation measures will be for these proposed trails.

There are 35.7 miles of proposed motorized trails that were given a soil rating of 1 to 3. Approximately 4.9 miles of proposed motorized trails that were rated 3 will require mitigation measures other than general maintenance (see Table 3- 55). These mitigation measures will be implemented before the facility is open to the public. See Appendix A for a description of the mitigation measures associated with resource issue codes.

Monitoring associated with resource issue code SW-27 will provide information to determine whether there is a need for additional actions to protect soil/watershed resources in the long term.

Table 3- 54. Alternative 2 – Proposed Motorized Trails with Adverse Effect

Analysis Unit	ID	Length (mi)	Tread Width	Assessment Rating	Soil and Water Resource Issue Codes
West Fall	JM-2y	0.50	24-50_INCH	4	SW-1, SW-2, SW-3, SW-15, SW-16, SW-19, SW-27
West Fall	JM-36	0.65	24-50_INCH	4	SW-1, SW-3, SW-15, SW-16, SW-19
West Fall	JM-7ay	1.01	24-50_INCH	4	SW-1, SW-2, SW-3, SW-14, SW-15, SW-16, SW-19, SW-27
West Fall	PK25	0.53	24-50_INCH	4	SW-1, SW-2, SW-3, SW-7, SW-15, SW-16, SW-19, SW-27
West Fall	PK-5	1.64	24-50_INCH	4	SW-1, SW-2, SW-3, SW-7, SW-15, SW-16, SW-19, SW-27
West Fall	SR-45z	0.25	24-50_INCH	4	SW-1, SW-2, SW-3, SW-7, SW-8, SW-9, SW-14, SW-15, SW-16, SW-19, SW-27
Total		4.58			

Table 3- 55. Alternative 2 – Proposed Trails that Require Mitigation

Analysis Unit	ID	Length (mi)	Assessment Rating	Soil and Water Resource Issue Codes ¹
West Fall	JM-23	0.42	3	SW-2, SW-27
West Fall	JM-27z	0.28	3	SW-2, SW-7, SW-27
West Fall	PK22	0.49	3	SW-19
West Fall	PK24	0.62	3	SW-2, SW-7, SW-27
West Fall	SR-13z	0.34	3	SW-2, SW-27
West Fall	SR-21z	0.83	3	SW-15, SW-16, SW-19, SW-3, SW-2, SW-27, SW-7
West Fall	SR-56z	0.10	3	SW-2, SW-7, SW-27
West Fall	SR-92	0.16	3	SW-2, SW-7, SW-27
West Fall	SR-94	0.21	3	SW-2, SW-7, SW-27
West Fall	SV31	0.11	3	SW-2, SW-7, SW-27
West Fall	SV35	1.18	3	SW-2, SW-7, SW-27
West Fall	TR-08	0.12	3	SW-2, SW-7, SW-27
Total		4.86		

¹Resource Issue Codes are defined in Appendix A of this FEIS. Design features and mitigation measures associated with these codes are applied to individual facilities, also found in Appendix A.

There is one, 6.12 acre area, called HSA-01 that has a slight HFC and is not a concern for the soil resource.

There are approximately 550 miles of inventoried unauthorized routes. Approximately 514 miles of unauthorized trails will be unavailable for public use, because motorized cross-country travel would be eliminated in Alternative 2. Based on the passive recovery analysis of unauthorized routes, approximately 429 miles of unauthorized routes would recover within 20 years. These routes are on deep, highly productive soils with vigorous vegetation, such as Bear Clover. Approximately, 62 miles of unauthorized routes would recover within 20 to 30 years. These routes are on moderately deep, shallow soils at higher elevations and have less vigorous vegetation growing adjacent to the trails. Approximately, 23 miles of unauthorized routes are expected to take more than 30 years to recover. These routes are on shallow soils with rock outcrop and sparse vegetation.

The soil concern for changes in the open and seasonal closure of NFTS roads and trails includes using NFTS facilities with sensitive soils and native surface during the wet season, which could cause rutting and off site erosion. There are 898 miles of NFTS facilities that will have changes in the open and season closure period. There are approximately 421 miles of NFTS facilities open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

See Water Resources, Cumulative Watershed Effects (CWE), Alternative 2 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Alternative 3

Alternative 3 responds to issues of impacts to natural and cultural resources and impacts to non-motorized recreational experience by prohibiting motorized cross-country travel. Seasonal open

and closure periods to existing NFTS roads and trails will not change from current management and no NFTS roads or trails will be added to the system. This alternative also provides a baseline for comparing the impacts of other alternatives that propose changes to the NFTS in the form of new facilities (roads, trails, areas). None of the unauthorized routes or areas would be added to the NFTS under this alternative.

Direct and Indirect Effects

There are approximately 550 miles of unauthorized routes that will not be used and will eventually recover soil productivity. Most of the unauthorized routes will revegetate and soil cover will be re established.

Based on the passive recovery analysis of unauthorized routes, approximately 473 miles of unauthorized routes would recover within 20 years. These routes are on deep, highly productive soils with vigorous vegetation, such as Bear Clover. Approximately, 62 miles of unauthorized routes would recover within 15 to 30 years. These routes are on moderately deep, shallow soils at mixed elevations and have less vigorous vegetation growing adjacent to the trails. These include JG5, JM-18, JSM61, PK-114z, PK-128, PK-51x, TH-28x, TH-31x, TH-47z, TH-48z, TH-54z, TH-56y, TH-41, JH-11, JH-12, JH-15, JH-18b, JH-40, JH-56, JH-78z, JH-90, JH-91, PK-01z, PK-04, PK-17, PK-22, PK-25, PK-41, PK-64, PK-65, PK-66. Approximately 23 miles of unauthorized routes would recover within 15 to 50 years. These routes are on shallow soils with rock outcrop and sparse vegetation. These include; AE-13, JH-20y, PK-05x, BP48, JSM56, TH-161z, JH-73, JH-77, JH-79, PK-01zf, PK-01zh, PK-01zk, PK-37, PK-39, PK-40, PK-41. Portions of eight unauthorized routes in the Miami Creek Basin and one unauthorized route in Jose-Chawanakee, totaling 8.79 miles are not expected to completely recover. These unauthorized routes have severe gully erosion, up to 3 feet deep and top soil has been displaced and severely disturbed. These unauthorized routes include: ES1, JM-17z, JM-2y, JM-36, JM-7ay, PK25, PK-5, SR-45z, and SV16. There are still a substantial number of unauthorized routes that have not been reviewed and their expected rate of recovery is unknown.

Alternative 3 does not change the open and closure season of roads, but is discussed in this alternative as a baseline to compare this action proposed in the other alternatives. The soil concern for changes in the open and seasonal closure of NFTS roads includes using roads with sensitive soils and native surface during the wet season. This could cause rutting of the road and off site erosion. There are approximately 574 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

Cumulative soil effects will be reduced from the elimination of motorized cross-county travel. The unauthorized routes will naturally recover and revegetate and soil cover will become established for most of the area now open to cross-country motorized travel. Sediment will be reduced and channel conditions and aquatic habitat conditions will improve. The ERA values in the 96 subdrainages that are over their respective lower TOC ERA values will decrease. Some of these subdrainages will continue to have potential from CWE from other activities occurring in the subdrainages. The Miami Creek area will be the most affected from natural recovery of unauthorized routes in these subdrainages. However, some of the unauthorized routes have resulted in severe gully erosion of up to 3 feet deep and top soil has been displaced and severely disturbed. See Water Resources, Cumulative Watershed Effects (CWE), Alternative 3 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Alternative 4

Alternative 4 responds to issues of impacts to motorized access and impacts to natural and cultural resources. This alternative adds roads and areas accessing recreation opportunities such as camping, fishing, picnicking and parking. This alternative provides safe traffic access while maintaining current passenger car recreational uses. This alternative also changes the location of many motorized trails and changes or applies additional seasonal or year-round closures (compared to Alternative 2) in cases where natural or cultural resource concerns were raised internally and/or by the public.

Direct and Indirect Effects

There are no proposed additions to the NFTS with potential to cause an adverse effect to the soil resource. There were no facilities with a soil rating of 4 included in this alternative. All 42 miles of proposed additions were given a soil rating of 1-3. Approximately 0.5 miles of proposed motorized trail (PK22) would require soil protection mitigation measures other than routine maintenance. These mitigation measures will be implemented before the trail is open to the public.

There are nine proposed areas that have a slight to moderate HFC (see Table 3- 56). These proposed areas were given a soil rating of 1 or 2. They are not a concern for the soil resource. It is assumed that routine maintenance to prevent runoff, erosion and a loss of soil productivity would be performed. There are 2 proposed areas that were given a severe HFC. These proposed areas were given a soil rating of 3. These proposed areas were field reviewed and determined to need mitigation that includes a seasonal restriction to prevent accelerated erosion. These areas will also be monitored to determine if additional mitigation measures will be required for their management. The severe HFC rating does not indicate that the motorized areas will not meet soil standards and guidelines. The HFC of severe for BLKRCK77 and VSTDM363 would require more intensive maintenance, application of a wet season closure, and monitoring. If monitoring determines that OHV use of the areas are not meeting soil standards and guidelines, prescriptive actions, such as surfacing the areas with aggregate could be implemented..

Table 3- 56. Alternative 4 – Motorized Areas

Analysis Unit	Area ID	Assessment Rating	HFC
Dinkey-Kings	BLKRCK77	3	Severe
Dinkey-Kings	BLUCYN152	2	Slight
East of Kaiser Pass	KP@MHS9	2	Moderate
Gaggs	GRTRDCRK116	1	Slight
Gaggs	GRTRDCRK117	1	Slight
Tamarack-Dinkey	SFTMRCK179	2	Moderate
Tamarack-Dinkey	TULEMDW1	1	Slight
West Fall	CHPOSDDL390	2	Moderate
West Fall	FRSNODM94	1	Slight
West Fall	MCLDFLT375	2	Moderate
West Fall	VSTDM363	3	Severe

Because motorized cross-country travel would be eliminated, approximately 516 miles of unauthorized routes would no longer be used. Based on the passive recovery analysis of unauthorized routes, approximately 431 miles of unauthorized routes would recover within 20

years. Approximately 62 miles of unauthorized routes would recover within 15 to 30 years. Approximately 23 miles of unauthorized routes would recover within 15 to 50 years.

The soil concern for changes in the open and seasonal closure of NFTS facilities includes using roads or trails with sensitive soils and native surface during the wet season, which could cause rutting and off site erosion. There are 1742 miles of NFTS roads that will have changes in the open and season closure period. There are approximately 338 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

Cumulative soil effects will be reduced from the elimination of motorized cross-county travel. The unauthorized routes will naturally recover and revegetate and soil cover will become established for most of the area now open to cross-country motorized travel. Sediment will be reduced and channel conditions and aquatic habitat conditions will improve. The ERA values in the 96 subdrainages that are over their respective lower TOC ERA values will decrease. Some of these subdrainages will continue to have potential from CWE from other activities occurring in the subdrainages. The Miami Creek area will be the most affected from natural recovery of unauthorized routes in these subdrainages. However, some of the unauthorized routes have resulted in severe gully erosion of up to 3 feet deep and top soil has been displaced and severely disturbed. See Water Resources, Cumulative Watershed Effects (CWE), Alternative 4 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Alternative 5

Alternative 5 responds to the issues of impacts to motorized access and motorized use and ownership conflicts. This alternative adds some trails to provide a greater number and variety of motorized recreational experiences and more roads and areas accessing recreation opportunities such as camping, fishing, picnicking and parking. Seasonal and year-round closures are applied where needed for resource protection. This alternative provides safe traffic access while adding motorized trails to address the concerns identified by the public that concentrating motorized use to fewer designated facilities and areas would cause overcrowding and possible degradation of the motorized recreational experience.

Direct and Indirect Effects

Under this alternative there is concern for the soil resource for 1.61 miles of unauthorized routes that were given a soil rating of 4 where at least 50 percent has a red rating using the green, yellow and red soil monitoring rating system. The trails will be difficult to maintain and there is a high likelihood that the design and mitigation measures will not be effective due to the sensitivity of the soils. These trails will be closely monitored to ensure effectiveness of the measures and to determine if the trails should stay on the NFTS trail system. These proposed trails were given a soil rating of 4, because a determination was made that the effects could be adverse. The adverse affect will be short term and will not be permanent or irretrievable. These trails are included in the proposed action even though they have a soil rating of 4, because of the ensurance of close monitoring and the ability to remove the trails off the NFTS trail system, if an adverse effect occurs. This decision could be made after 5 years of monitoring. These proposed trails have severe gully erosion on trail gradients that range from 25 to 35 percent, and in several cases there is a bypass route to avoid the gully. These proposed trails would be mitigated by: re-aligning the trail, within 15 meters of centerline; restoring the old trail by regrading; tread hardening; erosion

control; stream crossing structures; seasonal restriction; installation of barriers; and monitoring. See Table 3- 54 and Appendix A for list of design features and mitigation measures applied to each proposed trail. It is unknown how effective the mitigation measures will be for these proposed trails. Monitoring associated with resource issue code SW-27 will provide information to determine whether there is a need for additional actions to protect soil/watershed resources in the long term.

Table 3- 57. Alternative 5 – Proposed Trails or Roads with Adverse Effects

Analysis Unit	ID	Length (mi)	Tread Width	Assessment Rating	HFC	Soil and Water Resource Issue Codes ¹
West Fall	JM-2y	0.50	24-50_INCH	4	Severe	SW-1, SW-2, SW-3, SW-15, SW-16, SW-19, SW-27
West Fall	JM-36	0.65	24-50_INCH	4	Severe	SW-1, SW-3, SW-15, SW-16, SW-19
West Fall	SV16	0.46	24_INCH	4	Severe	SW-1, SW-2, SW-3, SW-7, SW-14, SW-15, SW-16, SW-19, SW-27
Total		1.61				

¹Resource Issue Codes are defined in Appendix A of this FEIS. Design features and mitigation measures associated with these codes are applied to individual facilities, also found in Appendix A

There are 74.23 miles of proposed motorized trails that were given a soil rating of 1-3. Three (1.61 miles) were given a rating of 4. Approximately, 7.83 miles of these will require special mitigation measures other than routine maintenance (see Table 3- 58). These design features and mitigation measures will be implemented before they would be open to the public. See Appendix A – Summary of Facility Specific Data for the required design features and mitigation measures.

Table 3- 58. Alternative 5 – Proposed Trails and Roads That Require Design Features and/or Mitigation Measures

Analysis Unit	ID	Length (mi)	Assessment Rating	Resource Issue Code
West Fall	JM-14x	0.33	3	SW-2, SW-27
West Fall	JM-22y	0.34	3	SW-2, SW-27
West Fall	JM-23	0.42	3	SW-2, SW-7, SW-27
West Fall	JM-27z	0.28	3	SW-2, SW-7, SW-27
West Fall	JM-41	0.61	3	SW-2, SW-7, SW-27
West Fall	PK24	0.62	3	SW-2, SW-7, SW-27
West Fall	SR-13z	0.34	3	SW-2, SW-7, SW-27
West Fall	SR-56z	0.10	3	SW-2, SW-7, SW-27
West Fall	SR-92	0.16	3	SW-2, SW-7, SW-27
West Fall	SR-94	0.21	3	SW-2, SW-7, SW-27
West Fall	SV25	0.08	3	SW-2, SW-7, SW-27
West Fall	SV31	0.11	3	SW-2, SW-7, SW-27
West Fall	SV35	1.18	3	SW-2, SW-7, SW-27
West Fall	TR-08	0.12	3	SW-2, SW-7, SW-27
West Fall	JM-36	0.65	4	SW-1, SW-3, SW-15, SW-16, SW-19
West Fall	PK22	0.49	3	SW-19
West Fall	SR-21z	0.83	3	SW-15, SW-16, SW-19, SW-3, SW-2, SW-27, SW-7
West Fall	JM-2y	0.50	4	SW-1, SW-2, SW-3, SW-15, SW-16, SW-19, SW-27
West Fall	SV16	0.46	4	SW-1, SW-2, SW-3, SW-7, SW-14, SW-15, SW-16, SW-19, SW-27
Total		7.83		

There are 12 areas that have a slight to moderate HFC (see Table 3- 59). These proposed areas were given a soil rating of 1 or 2. These areas are not a concern for the soil resource. It is assumed that these areas will have general maintenance to prevent runoff, erosion and a loss of soil productivity. There are seven proposed areas that were given a severe HFC and a soil rating of 3. The severe rating was given to the areas because the areas are currently being used during wet weather conditions causing severe erosion. These proposed areas were field reviewed and determined to need mitigation that includes a wet season closure to prevent accelerated erosion. These areas will also be monitored to determine if additional mitigation measures will be required for their management. The severe HFC rating does not indicate that the motorized areas will not meet soil standard and guidelines. The severe HFC rating for the seven use areas indicates a higher level of maintenance and mitigation may be required. In this case mitigation includes wet season closure and monitoring. If monitoring determines that OHV use of the areas are not meeting soil and standard and guidelines, other mitigation, such as surfacing the areas with aggregate can be implemented.

The severe HFC rating does not indicate that the motorized areas will not meet soil standards and guidelines. The severe HFC of severe for the seven areas would require more intensive maintenance, application of a wet season closure, and monitoring. If monitoring determines that

OHV use of the areas are not meeting soil standards and guidelines, prescriptive actions, such as surfacing the areas with aggregate could be implemented.

Table 3- 59. Alternative 5 – Motorized Areas

Analysis Unit	Area ID	SOIL RATING	HFC
Dinkey-Kings	BLKRCK78	3	Severe
Dinkey-Kings	BLKRCK77	3	Severe
Dinkey-Kings	BLUCYN152	2	Slight
Dinkey-Kings	BLUCYN4	3	Severe
Dinkey-Kings	BLUCYN6	3	Severe
East of Kaiser Pass	KP@MHS9	2	Moderate
East of Kaiser Pass	ONSPRGSOF13	1	Slight
Gaggs	BSR373	3	Severe
Gaggs	CNTRLCMPSPR345	1	Slight
Gaggs	GRTRDCRK116	1	Slight
Gaggs	GRTRDCRK117	1	Slight
Gaggs	RCKCRKSPR391	2	Moderate
Gaggs	WHSKYFLLS351	1	Slight
Jose-Chawanakee	SGRLFHL223	3	Severe
Tamarack-Dinkey	SFTMRCK179	2	Moderate
Tamarack-Dinkey	TULEMDW1	1	Slight
West Fall	CHPOSDDL390	2	Moderate
West Fall	FRSNODM94	1	Slight
West Fall	MCLDFLT375	2	Moderate
West Fall	VSTDM363	3	Severe

Because motorized cross-country travel would be eliminated, approximately 482 miles of unauthorized routes would no longer be used. Based on the passive recovery analysis of unauthorized routes, 397 miles of unauthorized routes would recover within 20 years. Approximately 62 miles of unauthorized routes would recover within 15 to 30 years. Approximately 23 miles of unauthorized routes would recover within 15 to 50 years.

The soil concern for changes in the open and seasonal closure of NFTS roads and trails includes using roads with sensitive soils and native surface during the wet season, which could cause rutting of the road and off site erosion. There are 1688 miles of NFTS roads that will have changes in the open and season closure period. There is approximately 343 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

Cumulative soil effects will be reduced from the elimination of motorized cross-county travel. The unauthorized routes will naturally recover and revegetate and soil cover will become established for most of the area now open to cross-country motorized travel. Sediment will be reduced and channel conditions and aquatic habitat conditions will improve. The ERA values in the 96 subdrainages that are over their respective lower TOC ERA values will decrease. Some of these subdrainages will continue to have potential from CWE from other activities occurring in the subdrainages. The Miami Creek area will be the most affected from natural recovery of

unauthorized routes in these subdrainages. However, some of the unauthorized routes have resulted in severe gully erosion of up to 3 feet deep and top soil has been displaced and severely disturbed. See Water Resources, Cumulative Watershed Effects (CWE), Alternative 5 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Summary of Effects Analysis across All Alternatives

See Table 3- 60 for comparison of alternatives.

Table 3- 60. Soil Resources, Summary of Effects Analysis across All Alternatives

Comparison Criteria	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles with 4 Soil Rating and Requires Mitigation	8.5	4.58	N/A	0	1.61
Miles with 3 Rating and Requires Mitigation	0	4.86	N/A	.5	6.22
Miles that will Passively Recover within 20 Years	0	429	473	431	397
NFTS Roads or Trails On Native Surface (sensitive soils) open all year	574	421	574	338	343

Compliance with the LRMP, Travel Management Rule and Other Direction

Alternative 1, No Action, provides unrestricted use of the unauthorized routes assessed and continuance of cross-country travel will not meet soil standard and guidelines. There are approximately 574 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown whether the road surface condition is meeting the intent of the LRMP standard and guideline that calls for stabilization and providing road surface drainage (see LRMP S&G 129, USDA-FS 1991 and LRMP Letter of Correction, USDA-FS 2009).

Under Alternative 2, 3, 4 and 5, it is unknown whether the road surface condition is meeting the intent of the LRMP standard and guideline that calls for stabilization and providing road surface drainage (see LRMP S&G 129, USDA-FS 1991 and LRMP Letter of Correction, USDA-FS 2009). There are approximately 421 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC.

Other than road surfacing requirements under LRMP S&G 129, Alternatives 2-5 would be in compliance with LRMP standards and guidelines and the Travel Management Rule for minimizing effects to soil resources.

3.9 Geological Resources

3.9.1 Introduction

National Forest management activities, including development of geologic resources, can result in ecosystem damage when the activity's location, design, construction or implementation is not based on an understanding of geologic conditions and geomorphic processes.

Geological resources affect all aspects of NFS lands. Geological resources include cave management, paleontological resources, geological special interest areas and groundwater management. Geological hazards can impact public safety on NFS lands. Hazards can include rock falls, debris flows, slope stability issues and public health concerns.

Geology determines watershed morphology, soils types and other essential functions for NFS lands. Groundwater is a valuable resource that may be affected by project planning. Mining and minerals management is included in the management of NFS lands could be affected by the proposed project.

Mining related hazards are a concern for public safety as the National Forests have potentially dangerous abandoned mine shafts and hazardous products in the areas of the proposed action.

The proposed action could potentially impact geological resources. Geologic and mining related hazards could be impacted which could result in a threat to public health and safety.

Analysis Framework: Statute, Regulation, LRMP and Other Direction

The following statutory authorities govern geologic resources and services activities essential to Forest Service programs:

- 1. Watershed Protection and Flood Prevention Act of August 4, 1954, as Amended (68 Stat. 666; 16 U.S.C. 1001). (FSM 2501.1.)** This act authorizes the Secretary of Agriculture to share costs with other agencies in recreational development, groundwater recharge and water-quality management, as well as the conservation and proper use of land.
- 2. Federal Water Pollution Control Act of July 9, 1956, as Amended (33 U.S.C. 1151) (FSM 2501.1); Federal Water Pollution Control Act Amendments of 1972 (86 Stat. 816) (FSM 2501.1) and Clean Water Act of 1977 (91 Stat. 1566; 33 U.S.C. 1251). (FSM 2501.1, 7440.1.)** These acts are intended to enhance the quality and value of the water resource and to establish a National policy for the prevention, control and abatement of water pollution. Groundwater information, including that concerning recharge and discharge areas and information on geologic conditions that affect groundwater quality are needed to carry out purposes of these acts.
- 3. National Forest Roads and Trails Systems Act of October 13, 1964 (78 Stat. 1089; 16 U.S.C. 532-538). (FSM 7701.1.)** This act provides for the construction and maintenance of an adequate system of roads and trails to meet the demands for timber, recreation and other uses. It further provides that protection, development and management of lands will be under the principles of multiple use and sustained yield of product and services (16 U.S.C. 532). Geologic conditions influence the final selection of route locations.
- 4. Mining and Minerals Policy Act of December 31, 1970 (84 Stat. 1876; 30 U.S.C. 21a).** This act provides for the study and development of methods for the disposal, control and reclamation of mineral waste products and the reclamation of mined lands. This requires an evaluation of geology as it relates to groundwater protection and geologic stability.

5. Forest and Rangeland Renewable Resources Planning Act of August 17, 1974 (RPA) (88 Stat. 476; 16 U.S.C. 1600-1614) as Amended by National Forest Management Act of October 22, 1976 (90 Stat. 2949; 16 U.S.C. 1609). (FSM 1920 and FSM 2550.) This act requires consideration of the geologic environment through the identification of hazardous conditions and the prevention of irreversible damages. The Secretary of Agriculture is required, in the development and maintenance of land management plans, to use a systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic and other sciences.

6. Surface Mining Control and Reclamation Act of August 3, 1977 (SMCRA) (30 U.S.C. 1201, 1202, 1211, 1221-43, 1251-79, 1281, 1291, 1309, 1311-16, 1321-28). This act enables agencies to take action to prevent water pollution from current mining activities and also promote reclamation of mined areas left without adequate reclamation prior to this act.

7. Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA) (94 Stat. 2767; 42 U.S.C. 9601, et seq). This act provides authority to the Environmental Protection Agency and to other Federal agencies, including the United States Department of Agriculture, to respond to release of hazardous substances, pollutants and constituents. It also provides for joint and several liability to potentially responsible parties (PRPs) for cleanup costs of existing water contamination. See also FSM 2160.

8. Federal Cave Resources Protection Act of 1988 (102 Stat. 4546; 16 U.S.C. 4301 et seq). This act provides that Federal lands be managed to protect and maintain, to the extent practical, significant caves.

9. FSM-2880.12 - Executive Orders. The following Executive Orders provide direction for geologic resources and services activities on National Forest System lands:

Executive Order 12113, Independent Water Project Review, January 5, 1979. This Executive Order requires an independent water project review by the Water Resources Council on preauthorization reports and preconstruction plans for Federal and Federally assisted water and related land resource plans. The technical review will evaluate each plan for compliance with the Council's principles and standards, agency procedures, other Federal laws and goals for public involvement.

10. LRMP Soils Standards and Guidelines for General Forest. The LRMP identifies three areas as Special Interest Areas for geological resources. There are: Kings Cavern Geological Area (388 acres), Courtright Intrusive Contact Zone and Geological Area (11 acres) and Dinkey Creek Roof Pendant Geological Area (640 acres).

Methodology

The geologic assessment conducted for the travel management project included potential hazards from abandoned mine lands (AML), potential hazards from Natural Occurring Asbestos (NOA), potential hazards from landslides, potential impacts to groundwater and groundwater dependent ecosystems and potential impacts from OHV use in Geologic Special Interest Areas.

Abandoned Mine Lands

Assessment for hazards associated with abandoned mine lands (AML) was conducted at the forest scale using two databases and GIS. A database of unauthorized routes was analyzed for proximity to AML sites in two public databases; see "Data Sources" for more information. Four categories of distance were used: unauthorized routes intersecting AML sites, those routes within

a 200 ft radius, those greater than 200 ft to and less than 0.25 mile radius and those greater than 0.25 mi. and less than 0.50 mile radius to AML sites in the database.

Assumptions

1. Significant mining operations appear in at least one of the databases used in this assessment. Mining operation sites not included in one of these databases were not considered. Unmarked sites may exist in the forest.
2. Where a precise location is recorded in the source documentation for a mine site, that location is reported in the Mineral Resource Data System (MRDS) (Schweitzer 2009).
3. All vehicle class types (both greater than and less than 50" vehicle types) result in the same effects.
4. As explained in section 3.1.1 the non-significant LRMP amendments do not have unique effects when compared to the other actions analyzed in this FEIS. Therefore the environmental consequences have been analyzed and will not be discussed further in the geologic resources section.

Data Sources

1. TOMS (Topographically Occurring Map Symbols) database, available from California Department of Conservation. The TOMS database is an inventory of mining features located on USGS 7.5 minutes topographic quadrangles.
2. MRDS (Mineral Resource Data System) database, available from the United States Geological Survey (USGS).

Recommended AML Assessment Priorities

1. As there are no AML sites within 200 feet of any proposed motorized trail or road in the action alternatives (Alternative, 2, 4 and 5) proposed roads or motorized trails identified within a 0.25 mile radius of an AML site are recommended as first priority AML sites to be analyzed by the Forest AML program. These would be open to the public.
2. Proposed roads or motorized trails identified within a 0.50 mile radius of an AML site are recommended to become the second priority AML sites to be analyzed by the Forest AML program. These would be open to the public.

Natural Occurring Asbestos (NOA)

Natural occurring asbestos was evaluated and is documented in the air quality section of the EIS. See air quality section for further discussion of NOA.

Landslide Hazards

Landslide hazards were evaluated and determined not to be a concern for potential impacts to the general public. Field review and assessment identified one unauthorized route, SR21z, with a slope stability concerns. This unstable area is approximately 80 ft long and is located at an approach to a channel crossing. This section of trail will have to be reconstructed and stabilized prior to opening up the trail. Landslide hazards will not be addressed any further in the geology section of this FEIS.

Groundwater and Groundwater Dependent Ecosystems

The presence and use of motor vehicle facilities was determined not to be a concern to groundwater and not to be in any violation of LRMP direction. Potential impacts to groundwater dependent ecosystems, such as meadows and springs were assessed and addressed in the aquatics and water section of the EIS. See aquatics and water sections for further discussion on groundwater dependent ecosystems.

Geologic Special Interest Areas

The SNF has three Geologic Special Interest Areas, including the Kings River Geological Area, the Dinkey Creek Roof Pendant Geological Area and the Courtright Intrusive Zone Geologic Area. Unauthorized routes are not located within the Kings River Geological Area and the Courtright Intrusive Zone Geologic Area. Unauthorized routes KD-248 and KD-249 are located in the Dinkey Creek Roof Pendant Geological Area. These unauthorized routes are included only in Alternative 1 and are currently being used. It is unknown if they are causing resource damage. There has been reported damage in the Courtright Intrusive Zone Geologic Area by unauthorized motor vehicle use. Barriers have been installed in an attempt to keep motor vehicle use out of this area. In summary, the Alternatives 2, 3, 4, 5 will have no effect to Geologic Special Interest Areas on the SNF. Geologic Special Interest Areas will not be addressed any further.

3.9.2 Affected Environment – Abandoned Mine Lands

Table 3- 61 summarizes the number of unauthorized routes or proposed facilities contributing to AML accessibility and exposure by alternative and distance.

Table 3- 61. Summary of Unauthorized Routes or Proposed Facilities Contributing to AML Accessibility and Exposure

Distance	Alt 1		Alt 2		Alt 3		Alt4		Alt 5	
	Unauthorized Routes	Use Areas	Proposed Trails	Use Areas						
Intersect	2	0	0	0	0	0	0	0	0	0
200 ft	16	0	0	0	0	0	0	0	0	0
0.25 mi	157	0	11	0	0	0	1	0	5	0
0.5 mi	437	0	22	0	0	0	2	1	13	1

3.9.3 Environmental Consequences-Abandoned Mine Lands

Alternative 1

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The direct effect of cross-country motorized travel is that 605,000 acres of SNF lands are open to exposure and accessibility to AML sites and associated hazards. There are 612 unauthorized

routes within half mile of known AML sites. Table 3- 62 summarizes this data for Alternative 1. See Abandoned Mine Land Report for list of those within 0.5 miles of AML.

Table 3- 62. Alternative 1 – Unauthorized Routes by Distance and Database

Distance	Unique Routes	Areas	Number of Routes	Number of Mines
Intersect	2	0		
			2	1
200 feet	15	0		
			5	4
			11	8
			2	1
>200ft. - <0.25 mi	157	0		
			119	50
			84	37
			3	1
>0.25mi - <0.5 mi	437	0		
			479	111
			243	75
			14	3

Additions to the NFTS

No facilities are proposed to be added to the NFTS in this alternative, there are no direct or indirect effects of this action.

Changes to the NFTS (this includes changing season of use, changing vehicle class, and opening or closing roads).

There are no changes to the NFTS in Alternative 1; therefore there are no direct or indirect effects.

Cumulative Effects

Alternative 1 would have the greatest potential for causing adverse cumulative effects to public safety because when added to the past, present and reasonably foreseeable actions, the probable proliferation of motorized access to lands adjacent to AML sites on the SNF would increase accessibility to these hazards. There will be 612 unauthorized routes within 0.5 miles of AML, which could be accessed by motor vehicle users.

Alternative 2

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The direct effect would be beneficial to public safety because prohibition of motorized cross country travel would restrict public accessibility and exposure to AML sites. SNF visitors would be unable to use motor vehicles to purposefully search for most of the inventoried AML sites.

The indirect effect of prohibiting cross-country motorized travel is decreased accidental exposure of AML sites. Accidental exposure could occur from a user following an abandoned access trail to a mine site.

Additions to the NFTS

Compared to Alternative 1 the direct and indirect effects of adding facilities are decreased access and exposure to AML sites and associated hazards such as unstable adits and shafts with collapse potential, drop-offs, pits, contaminated tailings and trapped gas. Alternative 2 has 34 proposed facilities within 1/2 mile from a known AML (Table 3- 63). OHV Route JM-36 was identified as being within 200 feet of an AML. This AML site was assessed and deemed safe from mining related hazards.

Table 3- 63. Alternative 2 – Facilities by Distance and Database

Distance	Unique Facilities	Areas	Number of Facilities	Number of Mines
Intersect	0	0		
			0	0
200 feet	1	0		
			1	1
			0	0
			0	0
>200ft. - <0.25 mi	11	0		
			9	9
			2	2
			0	0
>0.25mi - <0.5 mi	22	0		
			18	20
			4	5
			0	0

Changes to the NFTS (this includes changing season of use, changing vehicle class, and opening or closing roads).

Changes of vehicle class and season of use for the existing NFTS are not expected to have a direct or indirect effect on public safety due to exposure to AML sites.

Cumulative Effects

Cumulative effects include direct and indirect effects under the prohibition action, adding facilities and changing facilities. These effects will be added to the current effects from the NFTS. Thirty-four proposed motorized trails would be within 0.5 miles of AML, which could be within walking distance of users of the trails. See Table 3- 61 for summary information of the number of routes contributing to AML accessibility and exposure by alternative and distance. When compared to Alternative 1, accessibility and exposure to AML sites is reduced in Alternative 2.

Alternative 3

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The direct effect would be beneficial to public safety because prohibition of motorized cross county travel would restrict public accessibility and exposure to most of the inventoried AML sites. Forest visitors would be unable to use motor vehicles to purposefully search for AML sites. The indirect effect of prohibiting cross-country motorized travel is decreased accidental exposure of AML sites. Accidental exposure could occur from a user following an abandoned access trail to a mine site.

Additions to the NFTS

No facilities are proposed to be added to the NFTS in alternative, there are no direct or indirect effects of this action.

Changes to the NFTS (this includes changing season of use, changing vehicle class, and opening or closing roads).

There are no changes to the NFTS in Alternative 3; therefore there are no direct or indirect effects.

Cumulative Effects

When added to the past, present and reasonably foreseeable actions, it is likely there would be a beneficial cumulative effect from prohibiting cross-country travel in Alternative 3. The positive cumulative effect would be benefit public safety because prohibition of motorized cross county travel would restrict public accessibility and exposure to most of the inventoried AML sites. OHV users would not be able to access these sites and place themselves at risk from hazards associated with AML, without walking from NFTS roads and trails.

Alternative 4

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The direct effect would be beneficial to public safety because prohibition of motorized cross county travel would restrict public accessibility and exposure to most of the inventoried AML sites. SNF visitors would be unable to use motor vehicles to purposefully search for AML sites. The indirect effect of prohibiting cross-country motorized travel is decreased accidental exposure of AML sites. Accidental exposure could occur from a user following an abandoned access trail to a mine site.

Additions to the NFTS

Compared to Alternative 1 the direct effects of adding facilities are decreased access and exposure to AML sites and associated hazards such as unstable adits and shafts with collapse potential, drop-offs, pits, contaminated tailings and trapped gas. Alternative 4 have three proposed facilities and one proposed area within 1/2 mile from a known AML sites (Table 3- 64).

Table 3- 64. Alternative 4 – Facilities by Distance and Database

Distance	Unique Facilities	Areas	Number of Facilities	Number of Mines
Intersect	0	0	0	0
200 feet	0	0	0 0 0	0 0 0
>200ft. - <0.25 mi	1	0	0 1 0	0 1 0
>0.25mi - <0.5 mi	2	1	1 1 0	1 1 0

Changes to the NFTS (this includes changing season of use, changing vehicle class, and opening or closing roads).

Changes of vehicle class and season of use for the existing NFTS are not expected to have a direct or indirect effect on public safety due to exposure to AML sites.

Cumulative Effects

Cumulative effects include direct and indirect effects under the prohibition action, adding facilities and changing facilities. These effects will be added to the current effects from the NFTS. Three proposed motorized trails would be within 0.5 miles of AML, which could be within walking distance of the trails. See for summary information of the number of routes contributing to AML accessibility and exposure by alternative and distance. See Abandoned Mine Land Report for list of those within 0.5 miles of AML. Public exposure to AML sites within 0.5 miles of the proposed facilities are minimal and will be short term (less than 5 years) until the AML site is assessed and the hazards are reduced. When compared to Alternative 1, accessibility and exposure to AML sites is reduced in Alternative 4.

Alternative 5

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The direct effect would be beneficial to public safety because prohibition of motorized cross country travel would restrict public accessibility and exposure to most of the inventoried AML sites. SNF visitors would be unable to use motor vehicles to purposefully search for AML sites. The indirect effect of prohibiting cross-country motorized travel is decreased accidental exposure of AML sites. Accidental exposure could occur from a user following an abandoned access trail to a mine site.

Additions to the NFTS

Compared to Alternative 1 the direct effects of adding facilities are decreased access and exposure to AML sites and associated hazards such as unstable adits and shafts with collapse potential, drop-offs, pits, contaminated tailings and trapped gas. Alternative 5 have 18 proposed facilities and 1 proposed area within 0.5 mile from known AML sites (Table 3- 65). Route JM-36 was identified as being within 200 feet of an AML. This AML site was assessed and deemed safe from mining related hazards.

Table 3- 65. Alternative 5 – Facilities by Distance and Database

Distance	Unique Facilities	Areas	Number of Facilities	Number of Mines
Intersect	0	0		
			0	0
200 feet	0	0		
			1	1
			0	0
			0	0
>200ft. - <0.25 mi	5	0		
			4	3
			1	1
			0	0
>0.25mi - <0.5 mi	13	1		
			13	4
			1	1
			0	0

Changes to the NFTS (this includes changing season of use, changing vehicle class, and opening or closing roads). Changes of vehicle class and season of use for the existing NFTS are not expected to have a direct or indirect effect on public safety due to exposure to AML sites.

Cumulative Effects

Cumulative effects include direct and indirect effects under the prohibition action, adding facilities and changing facilities. These effects will be added to the current effects from the NFTS. The addition of trails to the existing NFTS will increase accessibility and exposure to AML sites. However, there will be 18 NFTS trails and one area within 0.5 miles of AML, which could be within walking distance of the trail. See Table 3- 61 for summary information of the number of routes contributing to AML accessibility and exposure by alternative and distance. See Abandoned Mine Land Report for list of those within 0.5 mile of AML. Public exposure to AML sites within 0.5 miles of the proposed facilities are minimal and will be short term (less than 5 years) until the AML site is assessed and the hazards are reduced. When compared to Alternative 1, accessibility and exposure to AML sites is reduced in Alternative 5.

3.10 Water Resources

3.10.1 Introduction

Protection of water quantity and quality are an important part of the mission of the Forest Service (USDA-FS 2007). Management activities on National Forest System lands must be planned and implemented to protect the hydrologic functions of forest watersheds, including the volume, timing and quality of streamflow. The use of transportation facilities on National Forests for public operation of motor vehicles has potential to affect these hydrologic functions through interception of runoff, compaction of soils and detachment of sediment (Foltz 2006).

Management decisions to eliminate cross-county motorized travel, add facilities to the NFTS must consider effects on watershed functions.

Analysis Framework: Statute, Regulation, LRMP and Other Direction

Direction relevant to the alternatives as it affects water resources includes:

Clean Water Act of 1948 (as amended in 1972 and 1987) establishes as Federal policy the control of point and non-point pollution and assigns the States the primary responsibility for control of water pollution. Compliance with the Clean Water Act by National Forests in California is achieved under State law (see California Water Code and Porter-Cologne Water-Quality Act, below).

Non-point source pollution on National Forests is managed through the Regional Water Quality Management Plan (USDA-FS 2000), which relies on implementation of prescribed Best Management Practices (BMPs). The Water Quality Management Plan includes one BMP for OHV use (4-7) and 28 BMPs related to road construction and maintenance (2-1 to 2-28) (See Appendix H for a listing of the BMPs applicable to this project). All NFTS roads and trails open to OHV use are required to comply with applicable BMPs.

Of particular relevance for OHV management, BMP 4-7 requires each forest to: (1) identify areas or routes where OHV use could cause degradation of water quality, (2) identify appropriate mitigation and controls, and (3) restrict OHV use to designated facilities. This BMP further requires forests to take immediate corrective actions if considerable adverse effects are occurring or are likely to occur.

The California Water Code consists of a comprehensive body of law that incorporates all State laws related to water, including water rights, water developments and water quality. The laws related to water quality (sections 13000 to 13485) apply to waters on the National Forests and are directed at protecting the beneficial uses of water. Of particular relevance for the alternatives is section 13369, which deals with non point-source pollution and BMPs.

The Porter-Cologne Water-Quality Act, as amended in 2006, is included in the California Water Code. This act provides for the protection of water quality by the State Water Resources Control Board and the Regional Water Quality Control Boards, which are authorized by the U.S. Environmental Protection Agency to enforce the Clean Water Act in California.

The Sierra Nevada Forest Plan Amendment (SNFPA) (USDA-FS 2004a). The Record of Decision (ROD) for the 2004 SNFPA includes standards and guidelines (S&G) that apply to the ten Sierra Nevada National Forests for construction and relocation of roads and for management of Riparian Conservation Areas (RCAs). Applicable standards and guidelines include:

- S&G 70 requires the Forest Service to avoid road construction, reconstruction and relocation in meadows and wetlands. Reconstructing unauthorized routes to bring them to NFTS standards in meadows or wetlands should therefore be avoided. Only routes that already meet NFTS standards in meadows and wetlands should be proposed for addition to the NFTS.
- S&G 92 requires that the Forest Service evaluate new management activities within riparian conservation areas (RCAs) and critical aquatic refuges (CARs) during environmental analysis to determine consistency with Riparian Conservation Objectives (RCOs) at the project level and the Aquatic Management Strategy (AMS) goals for the landscape. Adding an unauthorized route to the NFTS is a new management activity and must comply with S&G 92.
- S&G 100 requires the Forest Service to maintain and restore the hydrologic connectivity of streams, meadows and wetlands by identifying roads and trails that intercept, divert or disrupt flows paths and implementing corrective actions.
- S&G 102 requires that the Forest Service determine if stream characteristics are within the range of natural variability prior to taking actions that could adversely affect streams.

The compliance of each alternative with the S&Gs for RCAs is evaluated and discussed in a separate report (Appendix J).

The SNF Land and Resource Management Plan (LRMP) (USDA-FS 1991). The direction for the management of riparian and hydrologic resources related to motorized use includes:

69. Give primary management emphasis in riparian areas to protect and enhance the riparian ecosystem, riparian vegetation, water quality, soils, fish and wildlife resources.

70. Riparian area protection and Streamside Management Zone (SMZ) determination will be based on methods described in FSH 2509.22, Sierra Supplement 1, which gives specific direction for width determinations.

75. Maintain or enhance productivity of Forest meadows to accommodate wildlife and range resources.

76. In stream reaches occupied by fish, any activity that results in trampling and chiseling of stream banks should not exceed 20 percent of any given stream reach. Controls such as re-routing trails, relocating dispersed campsites and/or fencing of areas will be used to manage activities and improve riparian conditions in identified areas not meeting this standard.

77. Protect streamside zones by locating new roads outside of riparian areas, except at stream crossings.

78. Avoid constructing new roads within the perimeter of meadows and other riparian areas where opportunities exist to relocate or obliterate existing roads.

79. When existing routes through riparian areas and meadows are not compatible with riparian dependent resources, consider re-routing.

120. Preclude the impacts of cumulative watershed effects (CWE) by applying appropriate BMPs and mitigation measures during project implementation. Utilize regional CWE methodology when refined for application within the Forest to assess each project for potential to incur cumulative effects.

123. Avoid development in floodplains, wetlands and riparian areas, except where alternatives will not meet essential management objectives or purposes. This includes bridges, approaches, water diversion structures and boat ramps.

124. BMPs will be implemented to meet water quality objectives and maintain and improve the quality of surface water on the SNF. Methods and techniques for applying BMPs will be identified during project level environmental analysis and incorporated into the associated project plan and implementation documents.

128. Apply appropriate erosion prevention measures (FSH 2409.23) on high erosion hazard soils under the following conditions:

- a. When exposed soils from an average of several 500-ft linear transects:
 - i. Exceed 150 feet on slopes of 15-35 percent,
 - ii. Exceed 75 feet on slopes of 35-65 percent or
 - iii. Exceed 25 feet on slopes over 65 percent;
- b. On linear disturbances, such as skid trails and firelines, cross-drain at the following intervals:

Percent Slope	HEHR	VHEHR
0-15	150	125
15-35	75	45
35-65	35	20
>65	15	15

129. Road construction on areas with High (H) and Very High (VH) Erosion Hazard Ratings (EHR) will follow standards in FSH 2509.22, Sierra Supp. No. 1, which gives direction concerning soil stabilization and road surface drainage. ... (See Appendix H).

210. Controlled use of the road system including road closures may be triggered by: ... b. snow or adverse weather; ... g. protection of sensitive resources.

Effects Analysis Methodology

This section describes resource-specific assumptions, sources of information used to support the analysis, indicators used in the analysis including the rationale as to why they were chosen, timeframes (short-term and long-term), the spatial boundary of the analysis and impacts relevant to water resources. For a map and description of the analysis units, refer to Chapter 1, Figure 1-2 and Table 1-1.

Assumptions specific to the water resources analysis:

1. Adverse effects of route use by motor vehicles include long-term damage to soil and water resources due to soil compaction, alteration of drainage patterns and destruction of vegetation.
2. Without active restoration, these effects will persist for periods of years to decades (depending on soil type, slope, etc.) following the prohibition of public motor vehicle use in the SNF.
3. Sediment production from motor vehicle use of native-surface NFTS facilities is increased by higher levels of traffic and is reduced by maintenance of drainage features (culverts, waterbars, ditches). While some research (Forsyth and others 2006, Luce and Black 1999) has shown that maintenance temporarily increases sediment yield from

- roads, maintenance has been shown to be key to preventing chronic erosion of road surfaces (Gucinski and others 2001).
4. The only changes being made to the NFTS that have the potential to affect water resources are the changes in use period. Allowing or prohibiting traffic when road surfaces are wet has effects on the amount of sediment generated from the road surface and on the stability / life of road drainage structures that function to control erosion. Roads that are closed year-round are more likely to establish vegetation on their surface, which would reduce the effects of the road on runoff as well. While the effects of various vehicle types (passenger cars, four-wheel drive trucks, ATVs and motorcycles) have been examined in some studies, the differences in the impacts of their use on existing roads and trails are not well documented in the literature. Because the changes in vehicle type are being made on the NFTS and none of the changes involve motorcycles (motorcycles being the most different vehicle type in terms of impacts), changes in vehicle class between highway-legal vehicles, all vehicles and vehicles less than 50" are assumed to have no effect on the impacts of the NFTS and will not be considered in the water resources analysis.
 5. The spatial boundary for the direct effects analysis is the project area boundary encompassed by the analysis units. Within this boundary, the specific areas requiring analysis include hydrologically sensitive areas (described below), unauthorized routes and NFTS facilities for which changes in season of use or vehicle class are proposed. Indirect effects and CWEs are analyzed at the Hydrologic Unit Code 8 (HUC8) subdrainage scale (generally 500 to 3000 acres, although some are outside of this size range; HUC7s have not been delineated on the SNF). Some of the HUCs extend outside of the analysis unit boundaries, so the boundary for this analysis is slightly larger than the boundary for direct effects. In areas where CWE concerns are identified at the HUC8 scale, they are also considered at the HUC6 scale (generally 10,000 to 50,000 acres). Although the analysis was conducted within watersheds, the discussion is structured around analysis units.
 6. Hydrologically sensitive areas include all designated riparian protection areas including RMAs, SMZs, RCAs and CARs, as defined in the LRMP (USDA-FS 1991) and SNFPA ROD (USDA-FS 2004a). Examples of hydrologically sensitive areas include streams, springs, lakes, reservoirs, fens, meadows and marshes, and their specified buffer areas. All areas of perennial and seasonal standing or running surface water and areas of perennially or seasonally saturated soil are included within these areas. RMAs and SMZs are contained within RCAs, which comprise the area used for GIS analysis of hydrologically sensitive areas. RCAs have been delineated as described in the Affected Environment section, and displayed in Table 3- 67.

Data Sources

The types of information utilized for the analysis are listed in Table 3- 66. All of the data is on file at the SNF and the project-specific field data is available in the project record.

Table 3- 66. Data Sources Used in the Analysis of Effects to Water Resources

	Data Type	Source	Use in Analysis
1	Route Inventories (Step 1) and associated tabular data	Field data collected for this project	Baseline information about existing motor vehicle use
2*	Route condition and stream crossing characteristics	California State OHV Soil Loss Monitoring (Red-Yellow-Green monitoring) and stream crossing observations collected for this project by Soils, Hydrology and Aquatics personnel	To determine actions needed prior to opening and to determine effects of adding routes to system
3	GIS analysis of hydrologically sensitive areas and interactions with routes and areas	SNF GIS layers; 2005 and 2006 NAIP (aerial photo) 1m digital imagery	To characterize the potential for unauthorized routes and areas to have an effect on water resources; implications for CWEs.
4	GIS analysis of changes in seasonal road closures	SNF GIS layers; TIS transportation database for each alternative	To characterize the effects of the changes in the road closure plan on water resources.
5	Stream channel data (SCI; PFC; Pfankuch stability ratings; etc)	Field data from the SNF Watershed and Aquatic Species program files	To describe the known characteristics of streams and their sensitivity to disturbance
6	Information regarding recovery from disturbances across the SNF	Documented in the Soil Resources section of this chapter (Rojas 2008)	To characterize the expected passive recovery of routes that are not added to the system
7	Records of previous management activities and other disturbances	FACTS database, GIS	To account for other known disturbances in the ERA analysis of Cumulative Watershed Effects

*Each route was screened in GIS to determine whether a site visit was necessary for the water resources analysis. Routes were identified for a field visit if any of the following were identified: the route crossed a channel of any stream order (including Order 1 / 0), entered an RCA, was located in an over threshold HUC8, or located on sensitive soils. In a few instances, NAIP imagery was used to eliminate a route from a site visit. For example, GIS indicated the route was located on a map unit containing sensitive soils, but imagery showed that the specific location was actually a granite outcrop. In a few cases, documentation provided by another resource area was used to conclude that there was no stream channel, erosion, etc occurring on the route, and therefore, a site visit for water resources data collection was not necessary. The rationale for each route meeting the criteria for a site visit that was eliminated using imagery or other information is contained in the project record.

Water Resources Analysis Methodology

The analysis methodologies for each of the four actions that make up the alternatives and for cumulative watershed effects are described below.

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

Indicators:

1. Miles of unauthorized routes in RCAs and number of stream crossings available for motor vehicle use (data sources 1 and 3);

2. Acres in RCAs open to cross-country motor vehicle use (data source 3).

Short-term timeframe: 1 year.

Long-term timeframe: 30 years (consistent with the established timeframe for evaluating CWEs on the SNF).

Spatial boundary: All SNF system lands with the exception of designated wilderness and special areas identified in the LRMP (e.g. Kings River Special Management Area, research natural areas), as contained in the AUs

Methodology: GIS analysis of unauthorized routes and open areas and interpretation based on observations and literature review.

Rationale: In a study of cross-country ATV impacts, Foltz and Meadows (2007) looked at the degree of disturbance based on leaf litter and vegetation cover, trail width (both tread and displaced material) and ATV rut depth. Tests showed that as little as 120 passes of an ATV along a cross-country route could result in what they called “high” disturbance (i.e., >60 percent loss of ground cover, trail width of greater than 72 inches and ruts exceeding 6 inches in depth). The study concludes that ATV traffic adversely affects natural resources and that all of the vehicles tested contributed to those effects regardless of the type of ATV or tire type.

The relevance of vehicle type is that a trail design that protects against erosion for one vehicle type may not work well for another vehicle type. Examples of this include hardened trail segments where the hardened tread width is narrower than the tread width of vehicles that use it, resulting in rutting alongside the improvement; or use of gravel to harden OHV trails, which may stay in place with four-tire vehicle use but is extremely susceptible to being displaced by motorcycle tires spinning out and flinging the gravel particles. Vehicle type is displayed in the route specific data shown in Appendix A.

Taylor (2001) reviewed studies that document impacts of motor vehicle use on erosion, water resources and riparian and aquatic habitats, including studies in Texas that found statistically significant effects from motor vehicle use on benthic macroinvertebrates, water quality in pools and disturbed vs. non-disturbed riffles.

Chin and others (2004) conducted a study on the effects of ATVs on stream dynamics that evaluated the amount of pool filling by fine sediment (i.e., the reduction of pool volume and depth) as compared to control watersheds where ATV use was not occurring. They found that the watersheds impacted by ATV use showed a reduction of mean pool volume by as much as 50 percent.

Impacts to stream channels, riparian areas and water quality are possible where this use occurs in RCAs. The RCA widths in the SNFPA (USDA-FS 2004a), were prescribed to protect both physical and biological components of the riparian system, including sediment and nutrient delivery, large woody debris recruitment and habitat occupancy and use by various species. (Outside of RCAs, disturbances that result from motor vehicle use would be less likely to affect water and sediment reaching streams, meadows or other hydrologically sensitive areas.)

Permitting four-wheel drive, ATV and motorcycle use only on designated routes will reduce the extent of impacts. While impacts on designated routes may be more severe than those that occur from more dispersed use, they can be effectively managed and mitigated. Restricting cross-country travel will minimize the number of stream crossings and riparian impacts and limit them to known areas that can be monitored and maintained.

2. Direct and indirect effects of adding facilities (unauthorized routes and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Indicators:

1. Miles of routes added in RCAs (data source 3);
2. Number of stream crossings added (data source 3);
3. Sum of route miles with documented erosional features (data source 2);
4. Numbers of locations where routes divert or have potential to divert streamflow (data source 2).

Short-term timeframe: 1 year.

Long-term timeframe: 30 years (consistent with the established timeframe for evaluating CWEs on the SNF).

Spatial boundary: All SNF system lands with the exception of designated wilderness and special areas identified in the LRMP (e.g. Kings River Special Management Area, research natural areas), as contained in the AUs

Methodology: GIS analysis of the added features, combined with field data (California State OHV Soil Loss Monitoring protocol, additional data collected at stream crossings) and known information about the affected environment (stream channel sensitivity, etc). Interpretation based on observations and literature review.

Rationale: Many published studies have documented that roads are a major disturbance in managed watersheds (Trombulak and Frissell 2000; Switalski and others 2004). Studies have consistently shown that roads produce more sediment than other forest management practices (Robichaud and others 2010). Unsurfaced roads and trails (such as the routes being analyzed for addition to the NFTS) contribute much more sediment than surfaced roads. For example, Coe's study (2006) on the El Dorado National Forest found that native surface roads produced 10 to 25 times more sediment than rocked roads. Surface erosion was also dependent on soil type, road surface type, road grade, cross slope, age of the road, traffic volumes and the effectiveness and spacing of drainage structures. In the South Fork Platte River, Welsh and others (2006) found that the mean sediment production from motor vehicle trails was 5 times higher than the mean from unpaved road segments.

When roads concentrate surface flow and deliver it to streams via surface flow paths, they are termed 'hydrologically connected' and they functionally increase the drainage density (Wemple and others 1996). Surface runoff can be delivered directly into streams via stream crossings or gullies formed at culvert outlets. In general, the greatest impacts from the transportation network come from the portions that are hydrologically connected. Roads and trails whose runoff drains onto hillsides where water infiltrates without reaching streams have fewer impacts on hydrology and water quality. In a study of forest road segments on the Eldorado NF, Coe (2006) found that 25 percent of the road segments surveyed were hydrologically connected. A local study in the Kings River Experimental Watershed (KREW) area in DNK analysis unit found that 13 percent of the road length in the study area was hydrologically connected (Korte and MacDonald 2005). Robichaud and others (2010) note that studies in the western U.S. have found between 23 and 75 percent hydrologic connectivity of roads.

Roads concentrate overland flow and generate more runoff than undisturbed areas and hydrologically connected roads deliver that runoff to streams more quickly and efficiently than undisturbed areas. Studies of the effects of roads on streamflows have had varied results, including that roads increased peak flows, decreased peak flows and had no detectable effect (Gucinski and others 2001). Several studies (Bowling and Lettenmaier 1997, Ziegler and others 2007) have attributed the majority of the increases in streamflows on roads intercepting subsurface flow at cutbanks. Since very few of the unauthorized routes have cut and fill

construction, interception of subsurface flow is likely to be less prevalent on these routes than on roads. However, the unauthorized routes still concentrate surface flow and may be more likely to deliver it via hydrologically connected segments than NFTS roads due to the lack of maintenance they receive. Jones and Grant (1996) found that roads shifted the timing of peak flows to be slightly earlier and also increased the peak flows slightly, though the increase was not statistically significant due to the variability of the events. There is more agreement that roads do not appear to affect annual water yield (Gucinski and others 2001).

While the effects of roads on the stream network of an area depend strongly on local factors, road density is an indicator of the road system's relative potential for affecting streams; the higher the road density, the greater the risk of significant impacts. A measure such as the length of hydrologically connected roads would provide a better indication of this potential (Gucinski and others 2001), but the data is generally not available across the SNF. Focusing on routes within RCAs should highlight those segments that are more likely to be hydrologically connected.

Stream crossings in particular have the potential to deliver increased runoff and sediment from the road, destabilize streambanks and affect channel function. Schnackenberg and MacDonald (1998) found that fine sediment in stream channels in Colorado was more strongly correlated with the number of road crossings than with the Equivalent Clearcut Area (similar to the Equivalent Roaded Acres used in this analysis, but indexed to the effects of clearcuts rather than to roads) in the watershed.

Roads can directly affect physical channel dynamics when they encroach on floodplains or restrict channel migration. Roads can also affect meadows and wetlands directly by encroachment and indirectly by altering surface and subsurface flow paths. Alteration of the hydrologic flow paths can indirectly affect meadow and wetland function, with the effects extending far beyond the area road itself. The effects can include erosion and/or lowering of the water table. Effects such as these would only be possible if routes are located within RCAs.

The potential for water to run down roads or trails is termed 'diversion potential'. When this occurs, streamflow diversions can be a major cause of road-related erosion (Best and others 1995; Furniss and others 1997). This is not a widespread occurrence on the SNF.

3. Changes to the NFTS (changing vehicle class, season of use and opening or closing roads).

Changing vehicle class between highway-legal vehicles, all vehicles and vehicles less than 50" is assumed to have no effect on the impacts of the NFTS and will not be considered in the water resources analysis (see assumptions in section 3.10.1).

Indicators:

1. Miles of roads with changes (increases/decreases) in the length of the winter season closure period (data source 4);
2. Miles of roads in RCAs and number of stream crossings open year-round (data source 4);
3. Miles of roads in RCAs and number stream crossings closed year-round (data source 4);

Short-term timeframe: 1 year.

Long-term timeframe: 30 years (consistent with the established timeframe for evaluating CWEs on the SNF).

Spatial boundary: All SNF system lands with the exception of designated wilderness and special areas identified in the LRMP (e.g. Kings River Special Management Area, research natural areas), as contained in the analysis units.

Methodology: GIS analysis of changes to seasonal restrictions and year-round prohibitions. Interpretation based on observations and literature review.

Rationale: Traffic on native surface roads generally results in elevated sediment production, particularly if it occurs during the wet season. Road erosion rates increase with increased traffic and if traffic is removed, the sediment concentration in road runoff decreases over time (Robichaud and others 2010). Ziegler and others (2001) found that motorcycle passes during rainfall simulation caused elevated sediment production; they also cite another study that found a more marked result from truck traffic. They attribute the increased sediment production to the amount of loose material on the road surface that is available for transport, because the spike in sediment transport gets smaller with each successive vehicle pass; however, they note that if the new routes had become incised by flowing water, the erosion would have been more persistent.

Forsyth and others (2006) found that high traffic levels on a gravel road during wet weather created ruts that increased erosion. Even in coarse-grained soils that do not develop rutting as a result of wet-weather use, more subtle surface deformation occurs that eventually renders the design shape of the road (crowning, drainage dips, etc) ineffective and leads to increased road surface erosion.

In order to reduce surface deformation and minimize sediment production from roads, Forest Service direction began incorporating the closure of native surface roads during wet periods 20 years ago in the Northern and Intermountain Regions (USDA-FS 1988). In California, the practice was incorporated into the published BMPs (USDA-FS 2000) that are accepted by the State Water Quality Control Board.

Focusing on roads in RCAs and stream crossings should highlight those segments that are more likely to have impacts to streams and riparian areas.

4. Non-Significant LRMP Amendments.

As explained in section 3.1.1 the non-significant LRMP amendments do not have unique effects when compared to the other actions analyzed in this FEIS. The amendment changing the language of S&G 17 pertaining to the management of ML1 roads updates the direction in the LRMP to be consistent with national direction. The potential for impacts to water resources results from the management status of individual roads, which have been analyzed under Action 3, Changes to the NFTS. Similarly, the potential impacts to water resources from the amendment regarding ROS class results from specific management actions that are made possible by the updated direction about where motorized use may occur. The only such action currently known is the addition of facilities to the NFTS, which are analyzed under Action 2, Adding facilities to the NFTS. Any future management actions that are facilitated by the change in ROS class are not yet foreseeable and cannot be analyzed at this time.

For these reasons, the environmental consequences of these amendments will not be discussed further in the water resources section.

Cumulative Effects

Indicator(s): For the Baseline CWE Assessment, ERAs was the indicator (data sources 1 and 7).

For the detailed CWE Assessment, which was conducted for areas affected by the addition of a facility to the NFTS in one or more alternatives and where the Baseline ERA or other information indicated a concern that required additional evaluation, the following indicators were used:

1. Number of stream crossings on routes that would be added to the NFTS (data source 1) and condition of those crossings (data sources 2 and 3);
2. Stream channel condition information (data source 5).

Timeframe: 30 years (the established timeframe for evaluating CWEs on the SNF).

Spatial boundary: The cumulative effects analysis for water resources was conducted by watershed areas. Each HUC8 that contains documented unauthorized routes and/or areas within the AUs was included in the analysis. (The SNF does not have complete watershed delineation at the HUC7 scale and instead uses the HUC8 for CWE analysis.) The HUC8s that are over their Threshold of Concern (TOC) are also discussed at the HUC6 scale in order to provide consideration for the possible downstream accumulation of effects from multiple HUC8s that are over TOC.

Methodology: Following the direction in FSH 2509.22, the CWE analysis has two components consisting of the R5 Baseline and Detailed CWE Assessments. The Baseline Assessment was conducted using the ERA model to determine if the ERAs in any HUC8s are currently at or over their lower TOC. In the ERA model, the percent ERA in a HUC8 is used as an index of watershed disturbance and the risk of impacts to watershed health. Each acre of activity is multiplied by a coefficient to express its level of disturbance to watershed function. Disturbance activities included roads and OHV trails, as well as past, present, and foreseeable vegetation management and logging activity, grazing, and land development (private and federal government) (see Gallegos, 2009 for more details on CWE analysis). The coefficients and ERA values for vegetation management and logging activities are determined by silvicultural prescription, logging system, and soil types. ERAs for vegetation management and logging are prorated by their age, assuming that 95 percent recovery occurs over 30 years (USDA-FS 1990: Chapter 20). The 95 percent recovery, as opposed to a 100 percent recovery, takes into account major skid roads and landings, which can take up to 50 years to recover. The coefficients and ERA values for roads and OHV routes are determined by their widths. Arterial, collector and local roads were calculated at 24 ft, 18 ft, and 13 ft wide, respectively and 24-inch motorcycle trails, 24 to 50-inch OHV trails, and over 50-inch trails/roads were calculated at 2 ft, 5 ft and 13 ft, respectively. All known disturbances that occurred within the past 30 years and all reasonably foreseeable disturbances are included in the ERA analysis. The HUC8s that are over their lower TOC (or where other information, particularly stream channel condition, indicated reason for concern about CWEs) and that would have facilities added to the NFTS were carried forward into a Detailed CWE Assessment. Those HUC8s that are over the lower TOC only in Alternatives 1 and/or 3 were not included in the Detailed Assessment, because none of the actions that would be taken in those alternatives would commit to perpetuating those ERAs. In those alternatives, unauthorized routes would either continue to be used by the public without mitigation by the agency (Alternative 1) or would cease to be used but still would have no additional mitigation (Alternative 3). Unauthorized OHV routes in Alternative 3 were assumed to passively recover over time (Rojas and others, personal communication, 2008; also see the Soils section for discussion of passive recovery of unauthorized OHV routes). The Detailed Assessment focused on those HUC8s where actions taken by the agency would have an effect on these routes that could have implications for CWEs. Effects in other HUC8s are evaluated using the results of the Baseline Assessment. Refer to the CWE Report (Gallegos 2009) for more information.

The Detailed CWE Assessment includes interpretation of the risk of CWEs in the over TOC subdrainages, based on data sources 2, 3 and 5. This assessment is summarized in Table 3- 110.

Rationale: The ERA model was developed as a way to evaluate the accumulation of impacts from different activities through time. The SNF has established two TOCs for ERAs: a lower TOC, which is either 4, 5 or 6 percent, based on a determination of the natural sensitivity of the subdrainage, and an upper TOC, which is 14 percent for all subdrainages. Local observations support that CWEs are generally not observed in HUC8s where ERAs are below the lower TOC and that they are most frequently observed in HUC8s where the ERAs are above the upper TOC. Management actions are generally planned to prevent ERAs from exceeding 14 percent; however,

in very small HUC8s, even a small amount of disturbance can result in greater than 14 percent ERA. In addition, events such as wildfires can result in much higher ERA values. In the range between the two thresholds, Detailed Assessments are used to identify if a particular action is expected to alter the risk of CWEs.

There are limitations to the ERA model, including: ERAs are only an indicator and cannot be used to estimate quantitative changes in stream channel conditions; the higher risk associated with near-stream disturbance (as opposed to disturbance far from any stream channel) is not factored into the analysis; and the method does not account for site specific BMPs (i.e., all roads are weighted the same, regardless of their management and condition).

The Detailed Assessment allows for more specific knowledge of the area, including the position of the disturbances relative to the drainage network, whether BMPs are in place and the sensitivity and condition of stream channels, to be factored into the final determination of the risk for CWEs.

3.10.2 Affected Environment – Forestwide

As described in the Analysis Methodology/Rationale sections above, transportation facilities can affect stream channels, riparian areas and water quality. While erosion and localized changes to surface runoff can occur across the landscape, the risks of effects to streams, riparian areas and surface water quality are low if the use is far from hydrologically-sensitive areas. On the SNF, surface water and riparian areas are protected by RCAs. This analysis for water resources and therefore the affected environment focuses on RCAs.

Table 3- 67 describes how RCAs were delineated for this project. RCAs were delineated as directed in the SNFPA ROD (USDA-FS 2004a), based on the SNF GIS layer for streams. The SNF GIS layer for streams includes ‘blue line’ features (streams shown on USGS 7.5-minute quadrangle maps) and features that were added to the layer based on topography, from which the presence of a stream channel was inferred. All streams were then assigned a ‘stream order’ (Strahler 1957) based on their location in the drainage network. The smallest streams at the top of the network are labeled Order 1. Where two Order 1 segments join, they form an Order 2; where two Order 2 segments come together, they form an Order 3, and so on. The inferred streams are mapped as Order 1. These inferred streams have not been field verified, and their density varies across the Forest.

Field observations indicated that many Order 1 streams depicted on the stream layer are not present as scoured stream channels on the ground, but rather are unscoured swales (technically, ‘Order 0’). Although they do sometimes carry concentrated surface runoff, unscoured swales are not seasonal streams, and are not required to have RCAs. Where mapped Order 1 streams do support scoured channels, there is generally no associated riparian area and they tend to be dominated by upland / colluvial processes. To account for this, RCAs have been delineated only for those Order 1 stream segments that are associated with a lake, spring, or meadow, since these are more likely to have a scoured channel with at least seasonal / intermittent flow and, and are also more likely to support a riparian area. RCAs have also been delineated for all Order 1 streams within Critical Aquatic Refuges (CARs), in order to ensure maximum consideration and protection of the aquatic systems in those areas.

Ephemeral channels and unscoured swales that flow in direct response to precipitation or snowmelt can, however, transport sediment downstream through the channel network, so even though some Order 1 channels on the stream layer are not included for the purpose of delineating RCAs, all are included in the numbers of stream crossings presented later in this section.

Table 3- 67. Comparison of Feature Type, Stream Order, Flow Regime Classification and RCA Widths Delineated for this Project

Feature Type	Corresponding GIS Stream Order or Layer	RCA Width (feet)
Perennial streams	Order 4+	300 ft
Seasonally flowing streams	Order 2 - 3	150 ft
Ephemeral streams	Order 1	150 ft if associated with lake, spring or meadow or if in CAR; otherwise none
Streams in inner gorge	Stream order varies	To top of inner gorge (at least 300 ft)
Special Aquatic Features (fens, bogs, springs, seeps, lakes, ponds, wetlands, etc)	Corresponding GIS layer or identified in the field	300 ft
Perennial streams with riparian conditions extending more than 150 feet from edge of streambank	Either mapped as 'meadows' or identified in the field	300 ft
Seasonally flowing streams with riparian conditions extending more than 50 feet from edge of streambank	Either mapped as 'meadows' or identified in the field	300 ft

Table 3- 68 displays the length of Order 1 streams in the GIS layer that are within the delineated RCAs and the length outside of the RCAs.

Table 3- 68. Miles of Order 1 Stream Channels that Lie Within And Outside of the RCAs Delineated for this Project

Analysis Unit	Total Order 1 Streams (mi)	Order 1 Streams Within RCAs (mi / % of total)	Order 1 Streams Outside of RCAs (mi / % of total)
SFM	781	246 / 32%	535 / 68%
WES	873	269 / 31%	604 / 69%
GLO	758	298 / 39%	460 / 61%
GAG	885	247 / 28%	638 / 72%
MAM	650	299 / 46%	351 / 54%
SSB	765	219 / 29%	546 / 71%
EKP	74	22 / 30%	52 / 70%
JCH	527	349 / 66%	178 / 34%
TAD	879	393 / 45%	486 / 55%
DNK	1659	531 / 32%	1128 / 68%
TOTAL:	7851	2874 / 37%	4977 / 63%

As explained above in Data Sources, with few exceptions, the locations where a surveyed route crossed any type of channel shown on the GIS layer were evaluated in the field for impacts, RCO consistency and improvement needs.

The miles of perennial, intermittent and ephemeral streams, acres of meadows, and total acres of RCAs in each analysis unit are displayed in Table 3- 69. These RCAs include areas around streams, meadows, lakes, ponds and springs. The proportion of each analysis unit that falls within the RCA is also shown in Table 3- 69. These areas are important because they are more sensitive to disturbance, and certain specific S&Gs apply here. The analysis of effects to water resources

will focus on RCAs, as described in the Analysis Methodology (3.10.1 Introduction, page. 3-175).

Table 3- 69. Miles of Stream and Acres of Meadows and RCAs in each Analysis Unit

Analysis Unit (AU)	Streams (mi)			Riparian Areas		
	Perennial (order 4+)	Intermittent (order 2-3)	Ephemeral ¹ (order 1)	Meadows (ac)	RCAs (ac)	Percent of AU in RCA
SFM	102	380	781	678	22150	31
WES	113	441	873	918	26780	32
GLO	142	391	758	1545	31899	35
GAG	89	404	885	459	24970	29
MAM	97	281	650	136	21776	40
SSB	104	337	765	563	22868	27
EKP	18	33	74	174	3432	26
JCH	56	229	527	20	21444	46
TAD	141	467	879	1475	36398	32
DNK	223	826	1659	887	48291	31
TOTAL:	1084	3789	7851	6854	260,008	33

¹The miles of order 1 streams presented here as ‘ephemeral streams’ includes a large component of unscoured swales, which are technically ‘order 0’ and are not stream channels; therefore, these numbers over-estimate the actual number of miles of ephemeral stream channels across the project area. Only those Order 1 streams associated with a lake, spring, or meadow, or within a CAR, have RCAs delineated around them. The lengths of perennial and intermittent streams are more accurate.

CARs are important because they are specifically identified as areas where aquatic species habitat is to be protected for a special status species. Certain S&Gs apply only within CARs. The location of the CARs in the project area with respect to analysis units is shown in Figure 3- 12 and acreages are displayed in Table 3- 70. The percentages shown in the table indicate the proportion of the CAR that is contained in the respective analysis unit. For example, the Cow Creek CAR is completely (100 percent) within TAD. The West Fork Portuguese Creek CAR extends outside of the analysis units, but the area outside of the analysis unit is upstream, so no impacts from within the project area will affect stream channel conditions in that portion.

Table 3- 70. Critical Aquatic Refuges by Analysis Unit; Acres within Analysis Unit, Percent of Total CAR Acres in the Project Area

Analysis Unit	Acres of CARs in analysis unit (ac)	CAR Name				
		Cow Creek ac / %	Jose Basin ac / %	Lower San Joaquin ac / %	Snow Corral ac / %	West Fork Portuguese ac / %
SFM	0					
WES	0					
GLO	1199					1199 / 100%
GAG	478			478 / 2%		
MAM	10632			10632 / 52%		
SSB	5			5 / 0%		
EKP	0					
JCH	26350		16847 / 87%	9502 / 46%		
TAD	6135	4403 / 100%	148 / 1%		1584 / 100%	
DNK	2352		2352 / 12%			
TOTAL:	47151	4403	19347	20618	1584	1199

statistical flow data for the forest. Mean monthly stream flow data with at least 10 years of record are available to summarize general discharge characteristics for streams within each analysis unit. Monthly mean is an arithmetic average of all the flow data recorded for a particular month for the period of record. These data are presented in Table 3- 71. This project is not expected to measurably affect streamflow. Future streamflow data can be compared to previous flow records such as those displayed in Table 3- 71 to verify this.

Table 3- 71. Available Mean Monthly Stream Flow Records

Some of these are regulated streams. The listed stations have at least a 10 year period of record, within approximately 20 years of present. The period of record is shown by the date ranges. The eight digit numbers are the USGS gage identifier.

Analysis Unit	Station	Monthly Mean Streamflow, cubic feet per second (cfs)											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
WES	NF Willow Cr Near Sugar Pine CA (1965-2007) 11242400	29	29	40	51	78	50	17	5.7	4.1	4.6	9.3	14
WES	Miami Cr Near Oakhurst CA (1960-1980) 11257100	16	17	18	18	13	6.4	3.1	1.8	1.4	1.6	3.6	7.1
GLO	Granite Cr Near Cattle Mtn (1921-1986) 11228500	20	31	89	239	501	393	148	22	13	14	26	30
GAG	Browns Cr CN at Bass Lake CA (1986-2007) 11243300	20	32	48	52	39	18	6.6	1.6	0.60	1.2	4.2	10
SSB	MF Balsam Cr Below Balsam M FB Near Big Creek CA (1989-2006) 11238270	0.76	0.77	0.87	0.94	0.86	1.3	1.3	1.3	1.3	0.87	0.80	0.78
SSB	Big Cr Near Mouth Near Big Creek CA (1986-2007) 11238500	43	23	35	39	82	62	21	6.1	5.3	8.1	33	45
EKP	Bear Cr Near Lake Thomas Edison CA (1921-2007) 11230500	24	24	34	87	259	348	202	64	27	15	15	20
JCH	Stevenson Cr at Shaver Lake CA (1986-2007) 11241500	15	22	43	65	81	124	89	12	3.7	11	3.4	2.9
TAD	Eastwood PP Above Shaver Lake Near Big Creek CA (1987-2007) 11238250	266	243	240	380	780	931	700	557	469	304	256	281
TAD	NF Stevenson Cr at Perimeter Rd Near Big Creek CA (1989-2007)	11	10	16	35	31	22	8.2	5.9	5.8	5.6	7.0	6.7
DNK	Dinkey Cr at Dinkey Mdw Near Shaver Lake CA (1921-1987) 11217000	61	97	137	292	421	268	58	8.9	10	13	33	42
DNK	NF Kings River Below Dinkey Cr Near Balch Camp CA (1960-2007) 11218400	252	284	380	636	1040	854	288	59	48	50	87	134

Water Quality

Water quality is managed under the Central Valley Basin Plan for the San Joaquin and Sacramento River Basins (Central Valley Regional Water Quality Control Board 2009) and the Tulare Lake Basin (CVRWQCB 2004). These plans designate the beneficial uses to be protected, water quality objectives and an implementation program for achieving objectives. Table 3- 72 shows the designated beneficial uses for some of the major perennial drainages within project area. Descriptions of the beneficial use codes follow the table. Water bodies tributary to these major perennial drainages also fall under the same beneficial use criteria (i.e. the ‘Tributary Rule’). Assuming that the water quality currently meets or exceeds water quality standards, the water is subject to the Anti-degradation Policy, which requires that wherever existing water quality is better than the established objectives, the existing quality will be maintained (CVRWCB 2004, 2009).

Table 3- 72. Designated Beneficial Uses for the Major Perennial Drainages of the Project Area

Water Bodies	Analysis Units	MUN	AGR	POW	REC1	REC2	RARE	WARM	COLD	MIGR	SPWN	FRSH	WILD
San Joaquin River	MAM/SS B/ JCH	X	X	X	X	X		X	X	X	X		X
Fresno River	WES	X	X		X	X		X	X				X
Chowchilla River	WES				X	X		X	X				X
Merced River	SFM	X	X	X	X	X		X	X				X
Kings River at Pine Flat	DNK			X	X	X		X	X			X	X
Dinkey Creek	TAD/ DNK			X	X	X	X	X	X		X	X	X
Big Creek	DNK			X	X	X		X				X	X

Municipal and Domestic Supply (MUN) - Uses of water for community, military or individual water supply systems including, but not limited to, drinking water supply.

Agricultural Supply (AGR) - Uses of water for farming, horticulture or ranching including, but not limited to, irrigation (including leaching of salts), stock watering or support of vegetation for range grazing.

Hydropower Generation (POW) - Uses of water for hydropower generation.

Water Contact Recreation (REC-1) - Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs.

Non-contact Water Recreation (REC-2) - Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing.

Rare, Threatened or Endangered Species (RARE) - Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under State or Federal law as rare, threatened or endangered.

Warm Freshwater Habitat (WARM) - Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Cold Freshwater Habitat (COLD) - Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Migration of Aquatic Organisms (MIGR) – Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction and/or Early Development (SPWN) – Uses of water that support high quality habitats suitable for reproduction and early development of fish.

Freshwater Replenishment (FRSH) – Uses of water for natural or artificial maintenance of surface water quantity or quality.

Wildlife Habitat (WILD) - Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates) or wildlife water and food sources.

Central Valley Water Quality Control Board (CVRWQCB) Water Quality Objectives

Water Quality Objectives are narrative or numeric limits designed to protect beneficial uses of water. The parameters with specified objectives in the Central Valley Basin Plan include ammonia, bacteria, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, methyl mercury, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, tastes and odors, temperature, toxicity and turbidity. The parameters that this project has the greatest potential to affect are dissolved oxygen (DO), sediment, turbidity, chemical constituents and oil and grease. The other parameters are not likely to be affected by this project.

Dissolved Oxygen

DO is an important water quality parameter because aquatic organisms need oxygen. DO levels can range from 0 – 18 mg/l; levels of 5-6 mg/l are stressful for organisms and lower can be fatal. DO is related to water temperature; generally, cooler water has higher DO. Turbulence increases DO as oxygen from the air gets mixed into the water. Other factors that exert a control on DO include photosynthesis, respiration and decomposition of plant material. Photosynthesis only occurs during the day and it increases DO. Respiration and plant decomposition occur around the clock and deplete DO.

The applicable CVRWQCB (Regional Water Board) water quality objective for dissolved oxygen (DO) states:

“For surface water bodies outside the legal boundaries of the Delta, the monthly median of the mean daily DO concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent of saturation. The DO concentrations shall not be reduced below the following minimum levels at any time: WARM 5.0mg/l; COLD 7.0mg/l; SPWN 7.0 mg/l.”

A specific objective has been developed for the Kings River upstream of Pine Flat Dam, where the minimum DO is 9.0 mg/l.

Sediment

Sediment is the primary threat to water quality in the project area. The indicator used to measure sediment on the SNF is V^* (“V-Star”), which is the fraction of scoured pool volume that is occupied by fine sediment (Lisle and Hilton 1992, Hilton and Lisle 1993). This is thought to be a good index of variations in fine sediment supply. Lisle and Hilton (1999) show that V^* correlates with annual sediment yield in systems with abundant sandy sediment and that changes in V^* correspond to changes in the balance between sediment supply and sediment transport.

The CVRWQCB water quality objective for sediment states:

“The suspended sediment load and suspended sediment discharge rate of waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.”

The CVRWQCB water quality objective for settleable material states:

“Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.”

Turbidity

Turbidity is a measure of the amount of fine material suspended in the water. Water with higher turbidity is cloudier than water with low turbidity. Turbidity varies naturally and is often higher during rainfall runoff, especially during large storms. It is often higher when stream flow is rising than when stream flow is falling. Chronically increased turbidity can result in increased temperature because solar warming has a greater effect on water carrying fine sediment particles. Fine sediment particles can also be associated with nutrients and more nutrients can increase aquatic production, which in turn depletes DO. In the analysis area, erosion could carry fine sediment to streams and cause an increase in turbidity.

The applicable CVRWQCB water quality objective for turbidity states:

“Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:

- Where natural turbidity is less than 1 Nephelometric Turbidity Unit (NTU), controllable factors shall not cause downstream turbidity to exceed 2.
- Where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU.
- Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent.
- Where natural turbidity is equal to or between 50 and 100 NTUs, increases shall not exceed 10 NTUs.
- Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

“In determining compliance with the above limits, the Regional Water Board may prescribe appropriate averaging periods provided that beneficial uses will be fully protected.”

Chemical Constituents and Oil and Grease

Motor vehicle use results in the introduction of chemical constituents, including oil and grease, into the environment. Chemical constituents include a variety of substances including organic chemicals, inorganic chemicals and other contaminants such as metals. The chemical constituents

that have the potential to be affected by this project are chemicals contained in motor vehicle fluids and/or exhaust.

The applicable CVRWQCB water quality objective for chemical constituents states:

“Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses.”

The applicable water quality objective for oil and grease states:

“Waters shall not contain oils, greases, waxes or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.”

Chemical constituents may not exceed numeric levels set in Maximum Contaminant Loads (MCLs) in drinking water. For the protection of aquatic life, the maximum allowable levels are defined in National Ambient Water Quality Criteria, which have limits for acute exposures and for chronic exposures. These limits are specific to the constituent and to the organisms of interest and are contained in tables that are hundreds of pages in length.

There are no data that suggests there is a problem with chemical constituents, including oil and grease, affecting beneficial uses on the SNF. There have been known instances where an oil or gas spill has occurred and substances have entered surface water. Often these are small spills that are not reported, but are observed some time after their occurrence by personnel working in or near streams. There are also concerns with certain ford crossings, where vehicles drive through water that is deep enough to wash oil and grease off of the vehicle and directly into the water. The impacts of these types of chemical inputs is most likely to occur as acute (short-term, as opposed to chronic) toxicity to local aquatic species. These impacts are addressed in the Aquatic Species analysis.

For this project, based on the assumption that prohibiting cross-country use and confining motor vehicle use to designated routes will not significantly change the total amount of motor vehicle use that occurs, there is not expected to be much effect on the introduction of chemical constituents, oil and grease. While the introduction of these substances would become concentrated in and along NFTS facilities rather than occurring in more dispersed locations, there is not enough information regarding their occurrence or effects to determine the change in water quality impacts that would result. For this reason, chemical constituents, oil and gas will only be addressed generally.

Existing Water Quality Data

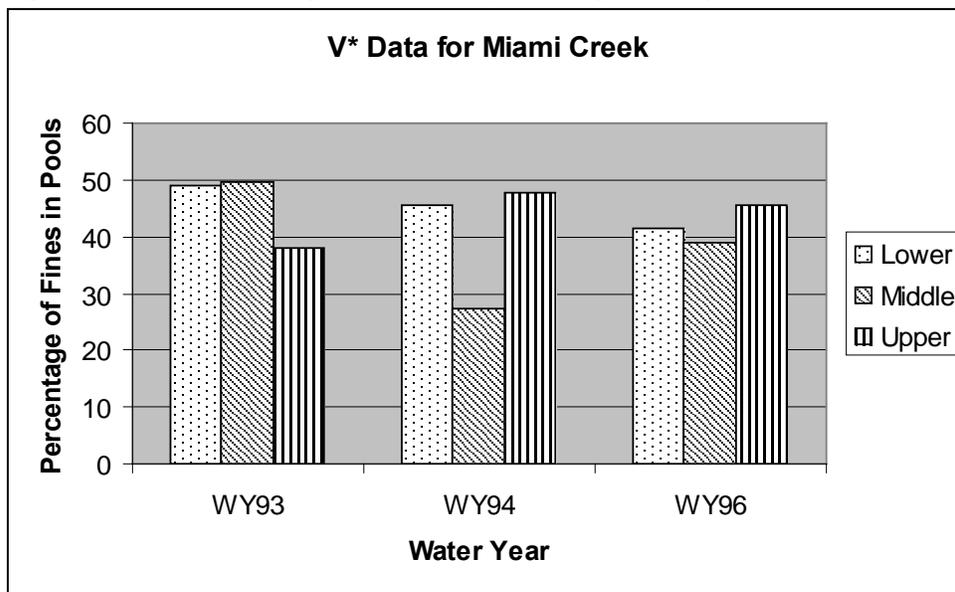
To date, limited water quality sampling has been conducted on the SNF. Between 1979 and 1983, water chemistry data was collected in thirteen streams throughout the forest. Data included dissolved oxygen, turbidity, physical properties (i.e., temperature, pH and conductance), major ionic constituents and nutrients. Although limited, this data serves as a general indicator of the water quality in these watersheds.

Since 1999, water quality data has been collected as part of Stream Condition Inventory (SCI) assessments and aquatic species-specific surveys. This information includes macroinvertebrate samples (an indicator of water quality, which is described in the Affected Environment of the Aquatic Biota section (section 3.14.2).

V* data has been collected in limited areas on the Forest, namely in the Miami Motorcycle Area (Miami Creek) and the Kings River project area (Big Creek, Dinkey Creek, and tributaries).

In 1992, a watershed improvement field study in the Miami area found unstable and degraded channel conditions and compromised aquatic habitat in Miami Creek (USDA-FS 1992). Since excess sediment delivery to Miami Creek was identified as the primary impact, a quantitative sediment study was conducted in 1996 using V^* . V^* measurements were repeated in 10 pools in Miami Creek between water years 1993 and 1996 (the flow was too high in Miami Creek in 1995 to safely conduct the surveys so no data were collected that year). The Desired Condition (DC) for pool habitat in Miami Creek includes a V^* value of 0.30 or less (i.e., 30 percent or less of the pool volume is filled with fine sediment). However, the 1993 data indicates a V^* value of 0.55, and in 1996, 0.44. Pools were grouped in the lower, middle and upper sections of the survey reach for display and comparison (Figure 3- 13). The data shows that, even with the elevated flows in 1995 that had adequate capacity to move sand-sized sediment downstream, enough fine sediment entered the Miami Creek system to replace what had moved downstream, resulting in the continued loss of pool function and fish habitat in all three reach segments in 1996. The report (Adams 1996) recommended that ‘approved’ motorized trails in the Miami area be formally added to the NFTS and that all trails (unauthorized routes) within the SMZ that were not part of the NFTS be given high priority status for restoration / obliteration. These trails discussed in the 1996 Adams report are not currently part of the NFTS, although some of the recommended restoration has been accomplished.

Figure 3- 13. Percentage of fines in pools by water year



Source: Adams 1996

Although V^* has not been measured in Miami Creek since 1996, a recent inspection of lower Miami Creek by a hydrologist, geologist, and fisheries biologist found most of the pools still contain accumulations of fine sediment. The overall aquatic habitat quality was characterized as poor (Strand 2008). The channel in upper Miami Creek is unstable (Pfankuch rating of Poor) and is still contributing sediment to the system. There is little comparative data to show a conclusive trend in channel condition and aquatic habitat, but a 1978 aquatics survey of Miami Creek (Bazlen 1978) describes the creek as “high quality” fish habitat with channel conditions ranging from good to fair and channel depth ranging from an average of 1 foot to 10 feet with 40% of the survey reach occupied by pools. These conditions were not observed (i.e., no fish, fewer pools, pools filled with sediment, and further degraded channel conditions) in 2008 (Strand 2008).

These observations show a clear deviation from DC and strongly suggest a downward trend in conditions since 1978.

The apparent cause of the degraded channel conditions is CWE. In the past, increased runoff and sediment delivery to the system triggered stream channel adjustments that have continued to the present time. A 1991 Soil and Watershed Monitoring Report (Roath 1991) identified direct impacts near the stream channel and its tributaries and sediment delivery from the road system as the major sources of sediment affecting Miami Creek. This monitoring effort found 30 plugged road culverts, many roadside drainage ditches filled with sediment, and common road erosion resulting from these problems.

The reports dating from the 1990s (Roath 1991, USDA-FS 1992, Adams 1996) and recent field observations (e.g., Strand 2008) suggest that near-channel disturbances such as timber harvests, roads and motorized trails, and streamside campsites are the main sources of the impacts to Miami Creek. These areas concentrated runoff and sediment, and delivered them to stream channels. The increases in streamflows and sediment delivery resulted in stream channel erosion in both low-order ephemeral channels and in the main Miami Creek channel. The ephemeral channels became incised and transported the additional sediment to Miami Creek, where lower gradients resulted in deposition of the excess sediment. The Miami Creek channel was undergoing a similar process, enlarging itself to accommodate greater volumes of water. The sediment deposition was creating a shallower channel, and acting in opposition to the enlarging process. In order to create a larger channel, the stream widened. Banks were destabilized and mature trees became undermined and fell into the channel. The falling trees resulted in additional bank erosion and further reduced bank stability. The erosion of the banks contributes even more sand to the system, and is probably another major source of sediment.

This feedback loop in channel condition has continued even though the original sources of the increased runoff have been identified and mitigated over time: compacted areas have recovered, widespread improvements have been made to the NFTS roads, and many miles of OHV trails have been improved or closed and restored. Continued work is needed to maintain these improvements so that they continue to function and prevent runoff and erosion from affecting streams. Some unauthorized routes have never been improved and are documented to have erosion and sediment delivery concerns of varying degrees. (This is discussed in the environmental consequences section (3.10.4).)

In the Kings River Project Area, V^* was collected in 1995, 1996, 1997, 2003 and 2004 in the Big Creek and Dinkey Creek subwatersheds to quantify existing fine sediment storage. The desired condition (DC) for sediment in pools in Big Creek, based on watershed potential considering the geology, soils and channel types, is a maximum of 30 percent. In the 1990s, V^* was measured in 20 reaches in Big Creek, above and below tributary channels and in selected tributary channels to determine if significant amounts of sediment were being transported from the tributaries. Forty (40) percent of the sampled areas had V^* values that exceeded the DC. The 2003-2004 data in Big Creek (see Table 3- 73) shows that both sampled reaches in Big Creek are above the DC. The reach in Summit Creek just above the confluence with Big Creek meets the DC. The reaches in Big Creek above (519.0012-1) and below Summit Creek (519.0057-1) have V^* values of .36 and .62, which indicates that a high amount of sediment may be contributed by Summit Creek.

The desired condition for sediment in pools in the Dinkey Creek watershed is a maximum of 20 percent. This is lower than the DC in Big Creek due to differences in soils and channel types. Twenty-four stream reaches were measured in Dinkey Creek in the 1990s, from the headwaters of Dinkey Creek and including several tributaries. Eighty-three (83) percent of these sampled areas met the DC. The reaches in upper (520.1002-1) and lower Bear Meadow Creek (520.1051-1 and 520.1051-2) are noteworthy because the measured V^* values were approximately 80 percent, far

higher than the DC. The reach in Oak Flat Creek (520.1151-1), tributary to Bear Meadow Creek, slightly exceeded the DC.

Table 3- 73. V* Reach Data 2003-2004

(Reaches beginning with 519 are located in the Big Creek subwatershed. Reaches numbered 520 are in Dinkey Creek.)

Stream Name	Reach Number	Number of Pools	Mean V*
Big Cr	519.0012-1	10	0.68
Big Cr	519.0057-1	10	0.40
Summit Cr	519.4051-1	10	0.18
Dinkey Cr	520.0056-1	3	0.04
Glen Meadow Cr	520.0017-1	10	0.16
Oak Flat Cr	520.1151-1	8	0.45
Oak Flat Cr	520.1151-2	10	0.61

Source: Morales 2004

The 2003-2004 data in Dinkey Creek shows that surveyed reaches in Dinkey and Glen Meadow Creeks meet the DC. Both surveyed reaches in Oak Flat Creek clearly exceed the DC.

303(d) Listed Waterbodies – ‘Water Quality Limited Segments’

A water body or segment of a water body (e.g., a fresh stream, river or lake) that does not meet (or is not expected to meet) water quality standards may be considered a “Water Quality Limited Segment” (WQLS). WQLS are added biennially by the CVRWQCB to the Clean Water Act Section 303(d) list of impaired waters. There are two WQLS on the SNF.

A segment of Willow Creek (MAM AU) was added to the 303(d) list in 2006 for failing to meet the water temperature objective. The listed segment is 6.2 miles long and is located downstream of the confluence of the North and South Forks of Willow Creek. The source of impairment is restricted (regulated) flow and excess fine sediment causing an increase in stream temperature. The Total Maximum Daily Loads (TMDLs) is scheduled to be completed by 2019.

The Fresno River (downstream of WES and of the SNF) was added to the 2008 303(d) list for failing to meet the dissolved oxygen (DO) objective. The listed segment is 30 miles long and is located between the confluence of Lewis Fork and Nelder Creeks and the Hensley Reservoir. The source of the impairment is unknown. Dissolved oxygen levels in the Fresno River could be influenced by the water quality (particularly sediment, turbidity, nutrients and temperature) of contributing waters from Miami, Lewis Fork, and Nelder Creeks. The TMDL is scheduled to be completed by 2021.

Stream Channel Data

Stream Condition Inventory (SCI), Proper Functioning Condition (PFC) and Pfankuch Stability surveys have been conducted on numerous streams forestwide (Table 3- 74, Table 3- 75 and Table 3- 76). None of these protocols are designed to specifically monitor the effects of roads or motor vehicle use. However, this data is useful for understanding stream channel condition, sensitivity to disturbances (including motor vehicle use), and the risk of channels exhibiting the effects of CWEs (unstable channels are more vulnerable to CWEs than stable channels, for example), as well as for tracking changes over time.

Stream Condition Inventory (SCI)

The purpose of the Pacific Southwest Region SCI is to collect intensive and repeatable data from stream reaches to document existing stream condition and make reliable comparisons over time within or between stream reaches. SCI is therefore an inventory and monitoring protocol. It is designed to assess the effectiveness of management actions on streams in managed watersheds (non-reference streams), as well as to document stream conditions over time in watersheds with little or no past management or that have recovered from historic management effects (Frazier and others 2005).

SCI consists of stream features or attributes that are useful in classifying channels, evaluating the condition of stream morphology and aquatic habitat and making inferences about water quality. Attributes are collected at selected reaches on streams of interest. Reaches are monumented to reduce variability when survey measurements are repeated. Macroinvertebrates were collected as part of the survey and have been submitted to Utah State University's Logan Bug Lab for processing (see the Aquatic Biota section for a full discussion of biotic conditions). In addition to aquatic insects, particle distribution and channel geometry information, large woody debris, bank configuration, shade, channel stability and limited water chemistry information was collected. Table 3- 74 lists the reaches where SCI has been conducted.

Table 3- 74. Stream Segments and/or Tributaries that have had SCI Surveys Conducted

Analysis Unit	Number of SCI Reaches	Locations
SFM	0	ND
WES	5	Lewis Fork (upper), Lewis Fork (Red Rock), Lewis (Westfall Trib), Nelder Cr, California Cr
GLO	6	Jackass Cr, Big Cr (Big Sandy Trib), Big Creek, White Chief Branch, West Fork Portuguese Cr, South Fork Willow Cr
GAG	3	South Fork Willow Cr (Trib), Camino Cr, Grizzly Cr
MAM	0	ND
SSB	0	ND
EKP	0	ND
JCH	1	Jose Creek
TAD	6	Glen Meadow Cr, Trib to Glen Meadow Cr, Laurel Cr, West Fork Cow Cr, South Fork Tamarack Cr (Trib), Snow Corral Meadow Cr
DNK	17	Big Cr (5), Trib to Big Cr, Summit Cr, Rush Cr, Oak Flat Cr, Bull Cr, Cottonwood Springs Cr, Duff Cr, Providence Cr, Bear Meadow Cr (2), East Fork Deer Cr, Deer Cr (a small portion of this reach is in TAD)
TOTAL	38	

SCI survey data are available in the project record. ND = No Data.

Proper Functioning Condition (PFC)

The PFC protocol was developed as a qualitative method for assessing the condition of riparian-wetland areas. A stream reach is in PFC when physical processes are providing resilience to disturbances and characteristics are present to: dissipate energy during high flows (reducing erosion); filter sediment; improve flood-water retention and groundwater recharge; develop root masses that protect streambanks from erosion; provide habitat for fish, wildlife and support other beneficial uses; and support biodiversity (USDI 1998). An area can function properly and still not meet its potential or its Desired Condition. Systems that are less resilient are "functioning at risk"

(FAR). FAR stream reaches have a high probability of degradation resulting from a high flow event. In these systems, it is important to determine whether the condition is improving (“upward trend”) or degrading (“downward trend”). If there is insufficient information to determine a trend, it is labeled “trend unknown”. Some systems are so unstable that they are classified as “non-functional”. Non-functional systems ‘clearly lack’ the elements described for PFC and are likely to suffer from erosion and degradation during even a moderate flow event. None of the assessed segments in the project area have rated non-functional. Table 3- 75 lists the stream segments where PFC surveys have been completed.

Table 3- 75. PFC Assessments by Analysis Unit

Analysis Unit	Total Number of PFC Assessments	PFC ¹	FAR-UT ²	FAR-TU ³	FAR-DT ⁴
SFM	0	0	0	0	0
WES	1	1	0	0	0
GLO	5	1*	2	1	1
GAG	6	3*	3*	0	0
MAM	5	3*	1	1	0
SSB	0	0	0	0	0
EKP	0	0	0	0	0
JCH	2	1	0	1*	0
TAD	2	0	1	1*	0
DNK	10	7	1	2	0
TOTAL	31	16	8	6	1

¹ PFC= “Proper Functioning Condition”;

² FAR-UT= “Functioning at Risk – Upward Trend”;

³ FAR-TU= “Functioning at Risk – Trend Unknown”;

⁴ FAR-DT= “Functioning at Risk – Downward Trend”;

Six of the PFC assessments noted impacts from roads or unauthorized motor vehicle use. Those are marked with a ‘*’ in Table 3- 75 and more information is presented below.

In GLO, the assessment of the Properly Functioning reach at Boggy Meadow identified unauthorized motor vehicle use impacting the channel upstream of the evaluated reach, causing localized bank erosion and contributing sediment to the channel. The FAR-downward trend rating occurred in the Long Meadow assessment, which cited grazing impacts to the already destabilized channel as the likely cause of the rating; motor vehicle use was not implicated.

In GAG, PFC evaluations at Peckinpah and Benedict Meadows noted that hydrologic connectivity of roads was a major contributing factor in previous channel degradation, though these roads did not seem to be having continuing impacts. Sand Creek (Gaggs tributary) had motor vehicle use in the channel, which was affecting bank stability and contributing some sediment in a localized area.

In MAM, the PFC assessment in Saginaw Cr describes excess sedimentation impacts of NFTS roads, but the reach still rated PFC.

In JCH, a PFC assessment in 523.3004 found that a small gully entered the stream from an NFTS road and contributed to the FAR condition.

In TAD, the FAR reach adjacent to Boneyard Meadow has multiple OHV crossings. The FAR rating is attributed to channel incision which is unrelated to the motorized use. However, the crossings create more disturbance and erosion due to the tall, steep, unstable banks and it impedes bank stability and vegetation growth.

Pfankuch Stability Ratings and Channel Sensitivity

The Pfankuch channel stability rating (USDA-FS 1975) was developed to evaluate the stream channel condition and stability from within the floodplain and stream channel. This method takes into account a total of 15 attributes from the upper banks, lower banks and channel bottom. Each attribute is assigned a numeric value based on observations made in the field. When the individual attribute scores are tallied, they are categorized into three different ratings: good, fair or poor. The total score of these ratings can range from 15 to 152 (USDA-FS 1975). Rosgen (1996) accounted for the effect of stream channel type on the attribute scores and developed a modified conversion matrix that uses channel type and numeric score to assign the Pfankuch stability rating. This information illustrates the expected sensitivity of streams to disturbances.

Since 1989, 561 miles of the major perennial drainages and their tributaries on the SNF have had channel typing and sensitivity analysis conducted. A complete list of the streams surveyed is available in the project record. Table 3- 76 summarizes the existing reach sensitivity data, based on Rosgen channel type (Rosgen 1996), and the associated Pfankuch rating for stream reaches with moderate or high sensitivity ratings. The stability ratings of low sensitivity reaches, for example, bedrock and boulder-controlled channels, are not included in this table because these channels are not sensitive to the effects that are evaluated in this report. The categories that are the most likely to respond negatively to disturbances – Moderate sensitivity/Poor stability and High Sensitivity/Fair or Poor stability - are marked with an asterisk in the table heading. The data is expressed as percentages of the total miles of streams surveyed, by AU. For example, in SFM, 6.3 miles of streams were surveyed, which were 29% Low sensitivity reaches and 71% High sensitivity reaches. There were no Moderate sensitivity reaches. The 71% High sensitivity reaches can be broken down into stability categories as follows: 60% of the total surveyed streams in SFM were High sensitivity channels with Good stability, and 11% were High Sensitivity channels with Fair stability.

Table 3- 76. Summary of Channel Sensitivity Ratings by Mile for Each of the Analysis Units, Including Pfankuch Stability Ratings

Analysis Unit	Total miles surveyed	Rosgen Sensitivity (% of total surveyed)			Modified Pfankuch Ratings Moderate sensitivity reaches (% of total miles surveyed)			Modified Pfankuch Ratings High sensitivity reaches (% of total miles surveyed)		
		Low	Moderate	High	Good	Fair	Poor*	Good	Fair*	Poor*
SFM	6.3	29	0	71	0	0	0	60	11	0
WES	51.3	49	12	39	2	1	9	23	11	4
GLO	160.1	50	18	31	5	7	6	22	8	1
GAG	125.4	48	21	31	2	5	15	21	7	3
MAM	37.6	48	8	44	0	1	6	19	22	3
SSB	30.1	57	13	29	2	1	11	10	15	4
EKP	0.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
JCH	15.4	81	5	14	0	1	4	13	1	0
TAD	71.3	65	12	22	5	3	4	9	7	7
DNK	63.8	66	3	30	1	2	1	15	7	9
TOTAL /AVERAGE	561.0	54	14	31	3	4	8	19	9	4

NFTS Facilities and Unauthorized Motorized Routes

The NFTS facilities, roads managed under other jurisdictions and unauthorized routes that are currently present in the project area are an important component of the context needed to fully understand the effects of each of the alternatives being analyzed for this project. Although the effects of NFTS facilities and other roads are not included in the direct or indirect effects of these alternatives, they are relevant to the affected environment (and to cumulative effects, since their effects are similar to the effects of the actions being considered).

As explained in the Analysis Methodology section above, road density is often used as an indicator of the risk for roads to impact hydrology and water quality, though the actual relationship between roads and effects is much more complex than the road density alone reflects. Table 3- 77 displays the densities of roads and trails, unauthorized motor vehicle routes and the total motorized route density (the sum). Table 3- 78 shows the densities within RCAs.

Table 3- 77. Miles and Density of Motor Vehicle Use (Roads and Trails / Unauthorized Routes / Total) by Analysis Unit

Analysis Unit	Roads & Trails* Miles (mi) / Density (mi/mi ²)	Unauthorized Routes Miles (mi) / Density (mi/mi ²)	Total Miles (mi) / Density (mi/mi ²)
SFM	156 / 1.42	23 / 0.20	179 / 1.62
WES	382 / 2.89	113 / 0.85	495 / 3.74
GLO	353 / 2.48	65 / 0.46	418 / 2.94
GAG	327 / 2.40	83 / 0.61	410 / 3.01
MAM	182 / 2.15	39 / 0.46	221 / 2.60
SSB	322 / 2.41	18 / 0.14	340 / 2.55
EKP	45 / 2.18	21 / 1.02	66 / 3.20
JCH	193 / 2.65	22 / 0.30	215 / 2.95
TAD	413 / 2.34	109 / 0.62	522 / 2.96
DNK	551 / 2.29	59 / 0.25	610 / 2.54
TOTAL / AVERAGE	2924 / 2.34	552 / 0.44	3476 / 2.78

*These include NFTS Roads and Trails and roads under other jurisdictions, i.e., private roads, roads managed under Special Use Permit, etc.

Table 3- 78. Miles and Density of Motor Vehicle Use in RCAs (Roads and Trails / Unauthorized Routes / Total) by Analysis Unit

Analysis Unit	Within RCAs		
	Roads & Trails* Miles (mi) / Density (mi/mi ²)	Unauthorized Routes Miles (mi) / Density (mi/mi ²)	Total Miles (mi) / Density (mi/mi ²)
SFM	47 / 1.36	7 / 0.21	54 / 1.58
WES	134 / 3.19	36 / 0.85	170 / 4.05
GLO	134 / 2.19	27 / 0.53	161 / 3.22
GAG	104 / 2.67	24 / 0.62	128 / 3.29
MAM	64 / 1.89	17 / 0.51	81 / 2.40
SSB	91 / 2.55	4 / 0.12	95 / 2.67
EKP	17 / 3.17	8 / 1.49	25 / 2.67
JCH	92 / 2.76	10 / 0.31	102 / 3.07
TAD	149 / 2.61	31 / 0.54	180 / 3.16
DNK	176 / 2.34	15 / 0.28	191 / 2.53
TOTAL / AVERAGE	1008 / 2.48	179 / 0.44	1187 / 2.92

*These include NFTS Roads and Trails and roads under other jurisdictions, i.e., private roads, roads managed under Special Use Permit, etc.

Another factor that is relevant to the affected environment is the prevalence of roads and other motor vehicle routes crossing streams (called ‘stream crossings’ or ‘crossings’). Since crossings are locations where the route is likely to be hydrologically connected to the drainage network, as well as where there is a risk of contributing sediment directly to the drainage network, the number of crossings is a good indicator for potential effects (see the rationale for this indicator). Similar to road densities, numbers of crossings do not factor in whether the crossing has appropriate BMPs that prevent negative impacts or not, so the numbers are useful only for perspective. The numbers of stream crossings made by roads, trails and unauthorized routes are displayed in Table 3- 79. These numbers include crossings of all stream orders, from major perennial streams to unscoured swales. Even unscoured swales will eventually deliver sediment stored in them to downstream reaches, which is why they are included in these totals.

Table 3- 79. Stream Crossing Numbers and Densities (Roads and Trails/ Unauthorized Routes / Total) by Analysis Unit

Analysis Unit	Roads & Trails*		Unauthorized Routes		Total	
	Number of crossings (#)	Crossing Density (# / mi ²)	Number of crossings (#)	Crossing Density (# / mi ²)	Number of crossings (#)	Crossing Density (# / mi ²)
SFM	717	6.5	134	1.2	851	7.7
WES	1,884	14.3	573	4.3	2,457	18.6
GLO	1,666	11.7	265	1.9	1,931	13.5
GAG	1,787	13.1	395	2.9	2,177	16.0
MAM	910	10.8	236	2.8	1,146	13.5
SSB	1,596	12.0	65	0.5	1,661	12.4
EKP	211	10.3	89	4.3	300	14.6
JCH	1,033	14.2	108	1.5	1,141	15.6
TAD	1,687	9.6	406	2.3	2,093	11.9
DNK	3,125	13.0	223	0.9	3,348	13.9
TOTAL / AVERAGE	Total 14,611	Average 11.7	Total 2,494	Average 2.0	Total 17,105	Average 13.7

*These include NFTS Roads and Trails and roads under other jurisdictions, i.e., private roads, roads managed under Special Use Permit, etc.

Note that the crossing densities in WES, JCH and GAG are the highest, while densities in SFM are relatively low.

Table 3- 80 displays the extent of sensitive soils, total motorized road / route density, and total stream crossing density by analysis unit. The highest potential for erosion and sediment delivery exist where high densities of sensitive soils and motorized routes converge. The WES AU has the highest amount of sensitive soils and the third highest density of motorized routes on sensitive soils. The percentage of sensitive soils in GLO, MAM, SSB and DNK AUs are not high, but the motorized route and stream crossing densities on those soils are high. JCH and GAG AUs also present concerns. Although the percentage of sensitive soils in SFM AU is high, the motorized route and crossing densities are low. EKP AU does not present concerns based on sensitive soils.

Table 3- 80. Comparison of Extent of Sensitive Soil by AU Relative to Road/Route and Drainage Crossing Density

Analysis Unit	Square Miles of Sensitive Soil ¹	Percentage of analysis unit (%)	Total Motorized Route Stream Crossing Density on Sensitive Soils (# /mi ²)	Total Road and Route Density on Sensitive Soils (mi/mi ²)
SFM	61 mi ²	56%	9.5	2.3
WES	90 mi ²	68%	16.8	3.9
GLO	4 mi ²	3%	12.4	4.3
GAG	44 mi ²	32%	15.7	3.1
MAM	12 mi ²	15%	24.3	4.3
SSB	12 mi ²	9%	27.1	4.5
EKP	0.01 mi ²	0.04%	0	0
JCH	31 mi ²	43%	20.6	3.6
TAD	0.4 mi ²	0.2%	0	0
DNK	60 mi ²	21%	18.5	3.5

¹Sensitive soils include Holland and *Utic Haploxeralf* families. A complete list of sensitive soil types can be found in the project record.

Managed Areas, Parking and Staging Areas

The SNF manages approximately 124 acres of areas, parking, and staging areas. Table 3- 81 displays the portion of these existing areas that lie within RCAs. The majority of the acreage lies in TAD and is associated with the Bald Mountain Route.

Table 3- 81. Acres of Managed Areas and Acres in RCAs

Analysis Unit	Managed Areas (ac)	Managed Areas in RCA (ac)
SFM	0	0
WES	2.7	1.4
GLO	3.5	1.4
GAG	0.1	0
MAM	1.0	0.1
SSB	0	0
EKP	0	0
JCH	0	0
TAD	114.7	21.1
DNK	1.7	1.7
TOTAL:	123.7	25.8

Seasonal Closures and Year-round Prohibitions on NFTS Roads and Trails

The season of use of roads and trails is related to their potential watershed impacts. Unsurfaced roads that are open year-round have a higher potential for erosion and sediment delivery because the action of the wheels on the wet road surface detaches sediment particles, and can create road surface deformation that channels water in the tire tracks and renders drainage features such as drain dips ineffective. There is also an increased likelihood for precipitation and runoff to carry the detached sediment to a stream, and to cause further erosion in the tire tracks. Roads or trails that are closed year-round are not subject to mechanical erosion from motor vehicle traffic. They

are more likely to have vegetation and other ground cover, which further limits runoff and erosion. Roads that are open to motor vehicle use but are closed in the wet season are not as likely to have vegetation and groundcover as roads closed year-round, but are also not as likely to have use during the periods when precipitation makes the surface deformable and carries detached sediment to streams.

There are currently winter restrictions on 454 miles of roads. There are year-round prohibitions on 257 miles of roads, 80 miles of which are in RCAs. There are 1824 miles of roads with no prohibition on winter traffic and 774 miles of these are in RCAs. Table 3- 82 shows the miles open and closed in RCAs and the numbers of stream crossings on those roads and trails.

Table 3- 82. Miles of NFTS Roads and Motorized Trails Open Year-round in RCAs, Miles of Roads and Motorized Trails Closed Year-round in RCAs and Numbers of Stream Crossing on those Roads and Trails

Analysis Unit	NFTS Roads and Motorized Trails Open Year-round in RCA (mi)	Crossings Open Year-round (# in RCA / # outside RCA / total #)	NFTS Roads and Motorized Trails Closed Year-round in RCA (mi)	Crossings Closed Year-round (# in RCA / # outside RCA / total #)
SFM	32	296 / 290 / 586	1	2 / 2 / 4
WES	118	874 / 694 / 1568	6	30 / 14 / 44
GLO	141	812 / 509 / 1321	3	16 / 2 / 18
GAG	79	542 / 597 / 1139	5	29 / 22 / 51
MAM	51	277 / 250 / 527	11	51 / 10 / 61
SSB	63	343 / 275 / 618	11	77 / 56 / 133
EKP	15	56 / 18 / 74	0.1	0 / 1 / 1
JCH	63	349 / 97 / 446	6	26 / 21 / 47
TAD	82	538 / 256 / 794	18	131 / 23 / 154
DNK	131	950 / 538 / 1488	19	158 / 122 / 280
TOTAL:	774	5037 / 3524 / 8561	80	520 / 273 / 793

Note that there are almost 10 times as many miles in RCAs (9.7 times) open year-round as closed year-round. There are also almost 11 times as many stream crossings open year-round as closed year-round.

3.10.3 Baseline (Current Condition) Cumulative Watershed Effects Analysis

The baseline ERA calculations indicated that there are unauthorized routes or areas present in 96 HUC8s that are over their lower TOC. The maximum ERA contribution from unauthorized features is 2.37 percent, which occurs in HUC8#503.0003, in the Miami area (WES).

Of these 96 HUC8s, seven are over the upper TOC of 14 percent. In these seven HUC8s, the ERA contribution from unauthorized features ranges from 0.03 percent to 1.25 percent. The highest contribution from unauthorized features occurs in HUC8#504.2251, in the Whiskers Campground / Central Camp area along North Fork Sand Creek (in GAG).

Twenty-five (25) of these 96 HUC8s analyzed in the Baseline CWE Assessment that would be affected by the action alternatives were carried forward into a Detailed CWE Assessment. The remainder of the over TOC HUCs were not carried forward into the Detailed Assessment they were only affected by Alternative 1 (No Action Alternative) and the information contained in the

five and high in five (three of these in the Miami area). In the Miami area, CWEs are currently occurring, as discussed in the Existing Water Quality section above. The information used to reach these conclusions is summarized for each of the 25 HUC8s following the table. Where HUC8s cluster inside larger HUC6 subwatersheds, the implications for the HUC6 are also discussed.

Table 3- 83. HUC8s Evaluated in a Detailed Assessment, Including the HUC6 they are within, their Existing ERAs and the Determination of the Existing Level of Risk of CWEs

HUC8	HUC8 Size (ac)	HUC6	Analysis Unit	Lower TOC (ERA%)	Existing ERA percent	Existing Risk of CWE
501.0023	1035	180400080302	WES	4	11.7	Low
501.4002	2947	180400080302	WES / SFM	4	7.7	Low
501.4003	857	180400080302	WES	4	8.4	Moderate
501.5101	1958	180400080302	WES	4	11.6	Low
503.0002	410	180400070101	WES	4	4.2	Moderate
503.0003	335	180400070101	WES	5	5.5	Moderate
503.0006	692	180400070101	WES	4	6.4	Low
503.0011	645	180400070101	WES	5	5.1	Low
503.0052	2291	180400070101	WES	4	6.4	High
503.0053	1602	180400070101	WES	4	3.1*	High
503.0054	2412	180400070101	WES	4	5.4	High
503.0055	2563	180400070101	WES	4	8.6	Low
503.0056	1211	180400070101	WES	4	10.8	Low
503.3051	1484	180400070101	WES	4	14.0	Moderate
504.2008	1014	180400061102	GAG	4	5.3	Low
504.2102	714	180400061102	GAG	4	5.2	Low
504.2151	711	180400061102	GAG	4	7.1	Low
504.2251	850	180400061102	GAG	5	23.5	High
519.3053	2083	180300100801	DNK	5	9.3	High
519.4051	1402	180300100801	DNK	4	9.8	Low
520.0017	1952	180300100701	TAD / DNK	4	7.1	Low
520.0056	1209	180300100701	DNK / TAD	5	14.1	Low/Mod
520.3002	1661	180300100702	DNK	5	7.4	Low
520.3003	1591	180300100701	TAD	4	4.6	Moderate
520.5001	1194	180300100701	TAD	5	5.8	Low

*Although the ERAs are not over the lower TOC, other information indicates that this HUC8 has CWE concerns, so it was included in the Detailed Assessment.

Subdrainages in the West South Fork Merced River HUC6 (180400080302)

501.0023 contains Squirrel Creek and its tributaries, which drain into the South Fork Merced River. This HUC8 has a High CWE sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 11.7 percent, including a total of 479 acres of treated timberlands of which 371 acres was commercially thinned in 2007. There are approximately 5.1 miles of roads. Unauthorized routes total 0.9 miles, with no channel crossings. Resident trout were observed in Squirrel Creek. Stream survey data indicates that 41 percent of the surveyed length has a naturally unstable channel system and none has a Poor stability rating. Available field data indicates that there is a low potential that CWE are occurring.

501.4002 contains Rush Creek and a main tributary. This HUC8 has a high CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 7.7 percent, including 761 acres of treated timber lands of which 404 acres was commercially thinned in 2007. There are approximately 13.4 miles of road. Unauthorized routes total 4.1 miles, with 32 channel crossings. Resident trout were observed in Rush Creek, where 41 percent of the surveyed stream length is naturally unstable channel types and 8 percent is naturally sensitive. Eight (8) percent of the surveyed channel has a Poor stability rating. Available field data indicates that there is a low potential that CWE are occurring.

501.4003 contains a tributary to Rush Creek. This HUC8 has a high CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 8.4 percent, including 225 acres of treated timber lands of which 153 acres was commercially thinned in 2007 and 2008. There are approximately 6.4 miles of road. Unauthorized routes total 2.6 miles, with 7 channel crossings. Resident trout were observed in the lower reaches of this tributary. Stream surveys found that 47 percent of the stream is a naturally unstable channel type and 38 percent is naturally sensitive. Thirty-eight percent of the channel system has a poor stability rating. Available field data indicates that there is a moderate potential that CWE are occurring.

501.5101 contains Laurel Creek, which drains into the South Fork Merced River. This HUC8 has a high CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 11.6 percent, including 710 acres of treated timber lands of which 696 acres was commercially thinned in 2007. There are approximately 5.8 miles of road. Unauthorized routes total 0.7 miles, with 5 channel crossings. Approximately 237 acres of private land has some disturbance, most likely related to logging activity. Resident trout were observed in Laurel Creek. Stream surveys indicate that 73 percent of the stream length has a naturally unstable channel and 12 percent is naturally sensitive. Five percent has a poor stability rating. Available field data indicates that there is a low potential that CWE are occurring.

These four subdrainages are tributary to the West South Fork Merced HUC6. In a recent snorkel survey of the South Fork Merced River, channel condition and aquatic habitat condition was reviewed. Water clarity was very good. There was very little fine sediment in pools and the channel bottom was found to be mostly bedrock, cobble and gravel. The West South Fork Merced River HUC6 has very little disturbance other than roads in the upper watershed areas and a few old mine sites. Most of the watershed has chaparral vegetation with very little timbered lands. The lower 2/3 of the channel is designated as a Wild and Scenic River. Available data for the South Fork Merced River indicates that the river is in good condition and CWEs are not evident.

Subdrainages in the Miami Creek HUC6 (180400070101): Carter Creek Drainage

503.0052 contains Carter Creek. The upper half of this HUC8 is on NFS lands, with the downstream half on private land. Carter Creek is tributary to Miami Creek. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 6.4 percent, including a total of 592 acres of treated timberlands, of which 163 acres was commercially thinned in 2006 and 2008. There are approximately 12.8 miles of roads. Unauthorized routes total 9.0 miles, with 52 channel crossings. Disturbances on the privately-owned portion are unknown. Current channel and aquatic conditions are unknown in Carter Creek; however, resident trout have been observed. The creek is similar to Miami Creek and has similar motorized use patterns as the main Miami area, including 52 unauthorized route channel crossings. Available data indicates that there is a high potential that CWE are occurring. Increased flows and sediment loads enter Miami Creek downstream of the SNF and may be contributing to a CWE response in that portion of Miami Creek.

Subdrainages in the Miami Creek HUC6 (180400070101): Miami Creek Drainage

503.0002 contains a tributary to Miami Creek. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 4.2 percent, including 85 acres timber lands that were treated between 1980 and 1986. There are approximately 3.1 miles of road, including 0.6 miles of road 6S15 which parallels the main channel. Unauthorized routes total 1.6 miles, with 5 channel crossings. Resident trout have been observed in the lower reaches of the intermittent stream. Site specific stream condition data is not available. Available field data indicates that there is a moderate potential that CWEs are occurring in this subdrainage; however, sediment generated here is contributing to downstream CWEs in Miami Creek (503.0053).

503.0003 contains a small tributary to Miami Creek. This HUC8 has a moderate CWE sensitivity and a corresponding lower TOC value of 5 percent ERA. The existing ERA value is 5.5 percent, including 40 acres of timber lands that were treated in 1986. There are approximately 2.8 miles of road. Unauthorized routes total 4.5 miles, with 26 channel crossings. Macro-invertebrates are the only aquatic species that have been observed in this intermittent stream. Site specific stream condition data is not available. Available field data indicates that there is a moderate potential that CWEs are occurring in this subdrainage; however, sediment generated here is contributing to downstream CWEs in Miami Creek (503.0054 and 503.0053).

503.0053 contains a reach of Miami Creek (the lowest reach on NFS lands) and several small tributaries. This HUC8 has a high CWE sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 3.1 percent, including 188 acres of timber lands that were commercially thinned between 1980 and 1986. There are approximately 6.1 miles of road. Unauthorized routes total 7.1 miles, with 68 channel crossings. Resident trout were observed in this reach of Miami Creek. Stream surveys indicate that 82 percent of the stream length has a naturally unstable channel and 7 percent is naturally sensitive. Thirty-nine (39) percent of the channel has a poor stability rating.

503.0054 contains an upstream reach of Miami Creek (the highest reach on NFS lands). This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 5.4 percent, including 476 acres of treated timber lands of which 400 acres was commercially thinned between 1986 and 1989. There are approximately 16.2 miles of road. Unauthorized routes total 13.8 miles, with 55 channel crossings. Resident trout were observed in this reach of Miami Creek. Stream surveys indicate that 21 percent of the stream has a naturally unstable channel and 6 percent is naturally sensitive. Six (6) percent has a poor stability rating.

Review of a stream survey conducted in Miami Creek in 1978 described the channel bottom as mostly bedrock and rubble, but also containing boulders, rocks, gravel, sand and silt (Bazlen 1978). This survey occurred prior to extensive use of the Miami area for motor vehicle recreation. Sediment monitoring in 1996 estimated V* at 44 percent (Adams 1996). A Watershed Assessment completed in the early 1990s focused on identifying sources of sediment. In that report, 51 percent of the identified sites needing restoration in the Miami Basin were associated with OHV trails, and another 10 percent with roads (USDA-FS 1992). However, this assessment did not establish a 'sediment budget' to determine the relative contribution of sediment from each of these identified watershed improvement needs. Since that assessment, watershed restoration projects have been implemented, trails and landings have been closed and stabilized, and roads have been surfaced with gravel. However, a recent review of the channel estimated that 76 percent of the pools were filled with fine sediment (Gallegos 2009), still far above the Desired Condition of 30 percent. This review concluded that the stream channel is showing signs of equilibrium upstream of Middle Bridge. However, aquatic habitat in Miami Creek overall

remains in poor condition, primarily due to accumulation of sediment (Strand 2008). Data collected on the unauthorized routes in the Miami Creek drainage in 2008 (available in project record) shows that gullies up to 3 feet deep are common on routes with slopes greater than approximately 20%, and some routes are delivering sediment directly to stream channels. A report on soils monitoring of the Miami OHV trail network (Roath 2000) has shown that an active OHV trail maintenance program is needed in order to prevent deterioration of trail condition. Available field data indicates that there is a high potential that CWE are occurring in Miami Creek in both 503.0053 and 503.0054.

Subdrainages in the Miami Creek HUC6 (180400070101): Lewis Fork Drainage

503.0006 contains tributaries to Lewis Fork and part of the Cedar Valley community. This HUC8 has a high CWE sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 6.4 percent, including 232 acres of timber lands that were commercially thinned in 2008 under the Cedar Valley Fuels Reduction Project. There are approximately 1.2 miles of road. There is 0.07 mile of one unauthorized route located along the ridge top, with no channel crossings. Macro-invertebrates are the only aquatic species that have been observed in this intermittent stream. Site specific stream condition data is not available. This subdrainage was assessed in the analysis for the Cedar Valley Project, when it was determined that there is some risk that a CWE response could occur if an above normal precipitation event occurs during the first 3 years after the Cedar Valley Project is implemented (Gallegos 2006). Available data indicates that there is a low potential that CWE are occurring.

503.0011 contains a tributary to Lewis Fork, including the stream at the Westfall Picnic Area. This HUC8 has a Moderate CWE Sensitivity and a corresponding lower TOC value of 5 percent ERA. The existing ERA value is 5.1 percent, including 91 acres of treated timber lands (of which 27 acres are proposed for treatment in the 2009 Sugar Pine Fuels Reduction Project) and the 2008 Westfall wildfire, which resulted in 26 ac of moderate severity burn and 50 ac of low severity burn in this HUC8. There are approximately 7.5 miles of road. Unauthorized routes total 2.25 miles, with 8 channel crossings. Resident trout have been observed in the lower reaches of the perennial stream. This subdrainage was assessed for the Sugar Pine Fuels Reduction Project (Gallegos 2008). Site specific stream condition data is not available. Available data indicates that there is a low potential that CWE are occurring.

503.0055 contains Lewis Fork between Sugar Pine and Cedar Valley and small tributaries. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 8.6 percent, including 1049 acres of treated timber lands, of which 130 acres were commercially thinned in 2008, under the Cedar Valley Project. There are approximately 12.2 miles of road. Unauthorized routes total 9.5 miles, with 60 channel crossings. This segment of Lewis Fork is a high gradient, bedrock controlled transport stream that is stable and has a limited probability of sediment deposition. Riparian vegetation (alder) is common in streamside areas. Habitat diversity and complexity are good, with a wide variety of observed habitat, abundant cover and woody debris. Stream temperatures meet Desired Conditions (Strand 2008a). Two ponds are located in the main stem of Lewis Fork Creek in the Sugar Pine private property (just upstream of this HUC8). These ponds collect the sediment from the upstream portion of the drainage. This subdrainage was assessed for both the 2007 Cedar Valley Project and the 2008 Sugar Pine Project. It was determined that there is some risk that a CWE response could occur if an above normal precipitation event occurs during the first 3 years after the Cedar Valley Project is implemented (Gallegos 2006). Available data indicates that prior to the Cedar Valley Project being implemented last year that there was a low potential that CWE were

occurring. Precipitation events over the next several years will determine whether CWEs will occur as a result of the Cedar Valley and/or Sugar Pine Projects.

503.0056 contains a tributary of Nelder Creek on the south side of Sivils Mountain. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 10.8 percent, including 461 acres of treated timber lands, of which 104 acres were commercially thinned in 2008 under the Cedar Valley Project. There are approximately 5.1 miles of road. Unauthorized routes total 3.4 miles, with 20 channel crossings. This sub-watershed was evaluated in the field for the Detailed CWE Assessment for the Cedar Valley Project (Gallegos 2006, Strand 2006). Channel conditions were good and evidence of accelerated channel erosion was not observed. Pools had 10 percent to 20 percent of their depth filled with fine sediment, which meets the Desired Condition. There is a depositional reach that also appears to be in good condition. Available data indicates that prior to the Cedar Valley Project being implemented last year, there was a low potential that CWE were occurring. It was also judged unlikely that a CWE response would occur as a result of the Cedar Valley Project (Gallegos 2006).

503.3051 contains the lower reaches of Nelder Creek, between California Creek and the confluence with Lewis Fork. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 14.0 percent, including 1653 acres of treated timber lands, of which 598 acres are proposed to be commercially thinned under the Cedar Valley Project. Several areas were logged in 1974 and 1975 and should be completely recovered - some of these same areas are proposed to be commercially thinned under the Cedar Valley Project. There are approximately 7.8 miles of road. Unauthorized routes total 4.9 miles, with 28 channel crossings. This subdrainage was assessed in 2007 for the Cedar Valley Project. It was determined that there is some risk that a CWE response could occur if an above normal precipitation event occurs during the first 3 years after the Cedar Valley Project is implemented (Gallegos 2006). Surveys of channel conditions determined that 100 percent of this portion of Nelder Creek is naturally sensitive. Available data indicates that prior to the Cedar Valley Project being implemented last year, there was a low potential that CWE were occurring. Precipitation events over the next several years will determine whether CWEs will occur as a result of the Cedar Valley Project.

The three distinct drainages in the Miami Creek HUC6 do eventually converge: Carter Creek is tributary to Miami Creek, which flows into the Fresno River about 8 miles downstream of the confluence of Lewis Fork with the Fresno River. There is a potential for CWEs to be propagated downstream from these distinct areas and result in accumulation of effects in the Fresno River. Channel conditions downstream of the SNF boundary in Carter Creek, Miami Creek, Lewis Fork and the Fresno River are unknown.

Subdrainages in the South Fork Willow HUC6 (180400061102)

504.2008 is a tributary of South Fork Willow Creek that enters between Sand Creek and Browns Creek. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 5.3 percent, including 12.7 acres of timber lands that were treated in 1994. There are approximately 3.8 miles of road. Unauthorized routes total 1.2 miles, including 3 channel crossings. Other than macro-invertebrates, aquatic species have not been observed in the intermittent stream. Existing data indicates that 28 percent of the stream length is naturally unstable and 12 percent is a naturally sensitive channel type. Twelve percent of the channel system has a stability rating of poor. Available field data indicates that there is a low potential that CWE are occurring in this HUC8.

504.2102 is tributary to Browns Creek. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 5.2 percent, including 122 acres of timber lands that were treated in 1997 and 1999. There are approximately 5.0 miles of road. Unauthorized routes total 0.7 miles, with five channel crossings. Resident trout were observed in the lower reaches of the main channel. Current channel and aquatic conditions are unknown in this creek. Available data indicates that there is a low potential that CWE are occurring in this HUC8.

504.2151 contains the lower reach of Browns Creek and several small tributaries. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 7.1 percent, including 114 acres of timber lands that were treated between 1999 and 2001. There are approximately 1.5 miles of road. Unauthorized routes total 2.8 miles, with 12 channel crossings. Resident trout were observed in Browns Creek, where 90 percent of the stream reach is naturally stable. Approximately 10 percent of the surveyed stream reach has a sensitive channel type and none has a Poor stability rating. Available field data indicates that there is a low potential that CWE are occurring in this HUC8.

504.2251 contains the lower reach of North Fork Sand Creek. This HUC8 has a Moderate CWE Sensitivity and a corresponding lower TOC value of 5 percent ERA. The existing ERA value is 23.5 percent, including 518 acres of timber lands of which 430 acres were treated between 2001 and 2008. This is well above the upper TOC value of 14 percent ERA. There are approximately 4.2 miles of road. Unauthorized routes total 3.1 miles, with 35 channel crossings. Approximately 1.7 miles of unauthorized routes (including BP35, BP43, BP62, BP72 and BP73) are located parallel to North Fork Sand Creek within the RCA. Resident trout were observed in this stream reach, where 10 percent of the reach is naturally unstable and 28 percent is a naturally sensitive channel type. Seventeen percent of the surveyed reach has a Poor stability rating, most likely occurring in the sensitive reaches. Available field data indicates that there is a high potential that CWE are occurring in this HUC8. The high number of stream crossings on unauthorized routes and the high amount of routes located near the creek make it likely that these routes are contributing to the observed CWEs.

Subdrainages in the Upper Dinkey HUC6 (180300100701)

520.0017 contains Glen Meadow Creek and all of its tributaries. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 7.1 percent, including 829 acres of timber lands, of which 365 acres are proposed to be treated in KRP. Without the disturbance associated with KRP, this HUC8 would not exceed the lower TOC. An additional 380 acres of timber land were treated in 1975 and should be fully recovered. There are approximately 12.0 miles of road. Unauthorized routes total 5.3 miles, with 30 channel crossings. Resident rainbow and brown trout have been observed in Glen Meadow Creek, where 91 percent of the surveyed stream length has a naturally stable channel and none is sensitive. The lower ½ mile of Glen Meadow Creek has a low gradient (<3 percent), B channel, with pool/riffle ratio of 1:1 and instream cover provided by terrestrial vegetation, boulders and undercut banks. Main channel pool habitat was the dominant pool type. Deposition of sand was noted in several pools and was ascribed to moderate recreation and grazing impacts in this reach. The middle reach of Glen Meadow Creek is a steep cascade with step pool habitat. Some sand was observed in some of the pools in this middle reach. The upper reach of Glen Meadow Creek is a steep cascade with step pool habitat and some lower gradient, B type channels, with Good to Fair stability (USDA-FS 1995c). A 1997 survey estimated V* at 14 percent, which meets the Desired Condition for this area. Available field data indicates that channel and aquatic habitat conditions are good and there is a low potential that CWE are occurring.

520.0056 contains the main stem of Dinkey Creek from about 0.3 miles downstream of Dinkey Fisherman to the confluence with Bear Creek and includes small streams draining the side slopes of this reach. It contains several meadows up to 12 acres in size. This HUC8 has a Moderate CWE Sensitivity and a corresponding lower TOC value of 5 percent ERA. The existing ERA value is 14.1 percent, including 637 acres of timber lands, of which 602 acres are proposed to be treated in the Kings River Project (KRP). (KRP was considered to be a future foreseeable action for this analysis, although it is currently unknown whether the project will be implemented. Without the 602 acres of disturbance associated with KRP, ERA values are well below the upper TOC.) There are approximately 11.5 miles of road. Unauthorized routes total 1.9 miles, with 4 channel crossings. Yosemite toad and resident trout have been observed in meadow habitats. All of the surveyed stream reaches have naturally stable channels, with no sensitive channel types. Dinkey Creek at the confluence with Bear Creek is dominated by cobble and rubble with an 11 percent sand/silt component. Just upstream of the Bear Creek confluence, the aquatic habitat consists of 34 percent pools, 17 percent riffles, 46 percent runs and 9 percent cascades. A 1995 survey estimated residual pool filling (V^*) at 2 percent. Available field data indicates that channel and aquatic habitat conditions are good and there is a low potential that CWE are occurring. Implementation of KRP would result in a Moderate potential for CWEs to occur in this HUC8.

520.3003 is the Snow Corral CAR, which was designated to protect Mountain yellow-legged frog habitat and also contains Yosemite toads. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 4.6 percent, including 375 acres of timber lands that were treated between 1985 and 1998. There are approximately 7.0 miles of road. Unauthorized routes total 1.4 miles, with three channel crossings. A 1995 survey of Snow Corral Creek estimated V^* at 21-49 percent, which is higher than expected in these channel types. The stream channel in Snow Corral Meadow and Trouble Meadow has knickpoints that are migrating upstream and could imperil stream habitat and the meadow hydrology necessary to protect the aquatic species present in the CAR. Previous stream channel restoration work has had limited success. Available data indicates that there is a moderate potential that CWE are occurring.

520.5001 contains the main tributary to Rock Creek and much of the Bald Mountain OHV Route. This watershed has a moderate CWE Sensitivity and a corresponding lower TOC value of 5 percent ERA. The existing ERA value is 5.8 percent, including 47 acres of managed areas. There are approximately 6.2 miles of road. Unauthorized routes total 6.2 miles, with 32 channel crossings. Aquatic species surveys in this area indicate that the stream channels are ephemeral and intermittent and no suitable aquatic habitat was identified. A recent review of Rock Creek, downstream of subdrainage 520.5001 and above the bridge at 9S09 (Gott 2008), found a boulder/cobble substrate with very few fines and stable gravel bars vegetating with riparian species. Channel banks appeared stable with no indicators of recent scour or deposition. Resident trout been observed in Rock Creek. Pfankuch channel stability ratings for most reaches were good. Channel substrate was mainly boulders and bedrock and channels are inherently stable. Available data indicates that there is a low potential that CWE are occurring in this subdrainage and downstream in Rock Creek.

Channel condition and aquatic habitat data is not available for the Upper Dinkey Creek HUC6. Given Dinkey Creek's steep, bedrock-controlled channel, it is unlikely that stream channel instability or sediment deposition attributable to CWEs would occur in the main stem of Dinkey Creek.

Subdrainages in the Lower Dinkey HUC6 (180300100702)

520.3002 contains Bull Creek and its tributaries. This HUC8 has a Moderate CWE Sensitivity and a corresponding lower TOC value of 5 percent ERA. The existing ERA value is 7.4 percent,

including 807 acres of timber lands, of which 420 acres are proposed to be treated in KRP. Without the disturbance associated with KRP, ERA values would be below the TOC. There are approximately 13.6 miles of road. Unauthorized routes total 1.6 miles, with one channel crossing. This subdrainage was assessed in KRP and is one of the Kings River Experimental Watersheds. Extensive data is available for this subdrainage from the Pacific Southwest Research Station, Fresno Lab. Yosemite Toad has been observed in meadows in the lower reaches of Bull Creek. Of surveyed stream reaches, 26 percent are naturally unstable channel types and none are sensitive. Twenty-one percent of the channel system has a poor stability rating, most likely occurring in the naturally unstable reaches. Available field data indicates that channel and aquatic habitat conditions are good and there is a low potential that CWE are occurring.

Subdrainages in the Kings Big Creek HUC6 (180300100801)

519.3053 contains the middle reach of Rush Creek. This HUC8 has a Moderate CWE Sensitivity and a corresponding lower TOC value of 5 percent ERA. The existing ERA value is 9.3 percent, including 1087 acres of timber lands, of which 467 acres were treated in 2004 under the South of Shaver Project, including whole tree yarding and tractor piling of logging slash and 60 acres are proposed to be treated in the Kings River Project (KRP). (KRP was considered to be a future foreseeable action for this analysis, although it is currently unknown whether the project will be implemented.) There are approximately 13.9 miles of road. Unauthorized routes total 2.6 miles, with 2 channel crossings. Resident trout and Western Pond Turtles have been observed in this reach of Rush Creek. This HUC8 was assessed in 2005 as part of the field review for KRP. The assessment determined that Rush Creek has stable stream banks and a large volume of fine sediment throughout the low gradient reaches. Pool filling with fine sediment (V^*) is estimated at 70-90 percent. A 4 foot measurement rod often could not reach the bottom of the sand deposits. The channel bottom consisted of bedrock and boulders with a continuous bed of fine sediment. Thick deposits of fine sediment were observed along the entire stream segments surveyed. The assessment determined that CWEs were occurring in Rush Creek (Hopson 2005). Available field data indicates that there is a high potential that CWE are occurring.

519.4051 contains Summit Creek and its tributaries. This HUC8 has a High CWE Sensitivity and a corresponding lower TOC value of 4 percent ERA. The existing ERA value is 9.8 percent, including 1042 acres of timber lands, of which 190 acres were treated in 1998 under the 10S18 Project and 359 acres are proposed to be treated in KRP. There are approximately 5.4 miles of road. Unauthorized routes total .75 miles, with two channel crossings. This HUC8 was assessed in 2005 as part of the field review for KRP. It contains mostly stable stream reaches. Measurements of residual pool filling (V^*) in a reach at the confluence of Summit Creek and Big Creek indicated V^* of 12 percent in 1995 (Gallegos 2004) and 18 percent in 2004 (Morales 2004). A channel analysis survey in 2004 indicated about 50 percent sands occupying the first perennial tributary to Summit Creek. Watershed improvement need inventories (WINI) collected between 1995 and 2004 indicate eight erosion sites are present. Each site is channel erosion initiated or influenced by culverts at road/stream crossings, including gully headcuts. Aquatic species found during surveys between 1990 and 2003 include the Western pond turtle and Relictual slender salamander (Forest Service sensitive species), garter snakes and unidentified trout species (Rainbow, Eastern Brook and Brown trout are Management Indicator Species for the SNF). These sightings occurred within approximately the first 850 meters (first ½ mile) of Summit Creek (Sanders and Hopson 2005). Available field data indicates that currently there is a low potential that CWE are occurring in this subdrainage.

Stream channel and aquatic habitat conditions for the Kings Big Creek HUC6 (180300100801) subwatershed have been assessed and monitored over the years and are documented in the Big Creek Watershed Analysis (Gallegos 2004) and described in the Affected Environment section,

(see Table 3- 73 and discussion). Available data indicates that Big Creek is not meeting desired conditions for water quality and aquatic habitat. The major issue in Big Creek is the amount of sediment occupying pools in the low gradient response reaches. This excessive sediment is affecting the quality of aquatic habitat and is a limiting factor for a healthy, productive aquatic ecosystem. Available data indicates there are elements of CWE occurring in the Kings Big Creek HUC6 (180300100801) subwatershed.

3.10.4 Environmental Consequences – Forestwide

See the effects analysis methodology section, above, for information about how this analysis was conducted.

Alternative 1 – No Action

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Allowing continued cross-country travel outside of closed areas would mean that the impacts of the motor vehicle use occurring on the unauthorized routes would continue (see Table 3- 84), in addition to impacts from more occasional, dispersed travel over the landscape.

The effects of continued cross-country motorized travel and route proliferation on water resources include increased sediment loads and possible peak flow increases due to compacted and unvegetated route surfaces and detachment of sediment by vehicles. Essentially, the unauthorized routes function like native surface roads that receive no maintenance. As described in the Methodology ‘Rationale’ sections (3.10.1), studies have found that maintenance of native surface roads is an important factor for reducing their impacts on streamflows and sedimentation, particularly on roads that receive vehicle traffic when soils are wet. This means that the unauthorized routes are likely to impact streamflows and sedimentation.

Impacts to stream channels, riparian areas and water quality would be possible where this use occurs in RCAs. (Outside of RCAs, any resulting disturbance would be far enough away from sensitive areas that they would be less likely to be affected.) Stream crossings in particular have the potential to deliver increased runoff and sediment from the road, destabilize streambanks and affect channel function. The miles of routes in RCAs and the number of stream crossings are listed by analysis unit in Table 3- 84. This table shows how many of the existing routes and stream crossings would remain open to motor vehicle use in Alternative 1, as well as how many fall within closed areas and would therefore not be available for motor vehicle use. The largest number of acres of RCAs open to use would be in DNK, although much of that area is steep, brushy ground that would not actually be used. The highest number of miles of existing routes in RCAs are in WES, GAG, GLO, TAD and DNK. Those analysis units and MAM also have high numbers of stream crossings on unauthorized routes that would be open to use. For these reasons, peak flow increases and sediment delivery related to cross-country use are the most likely to occur in WES, GAG, GLO, MAM and TAD. These areas would also be the most likely to experience other water quality impacts, including possible decreases in DO resulting from increased sediment delivery and the introduction of chemical constituents including oil and gas, especially at stream crossings.

Continued cross-country motor vehicle travel would have marked effects in WES, especially in the Miami area, because the easily erodible soils and steep slopes cannot maintain stability when the vegetation layer is lost as new routes are created. The existing density of unauthorized routes (0.85 mi/mi²) indicates that these impacts would continue to be widespread. Peak flows and water

quality in Miami Creek and North Fork Willow Creek would continue to be affected as a result. Sediment inputs would likely continue and could increase in Miami Creek, and sediment in pools (V*) would continue to exceed the DC. Because of concentrated use near the North Fork Willow Creek, the reaches with poor stability and high sediment loads would recover the most slowly in this alternative.

Even though the density of unauthorized routes is lower in DNK (0.25 mi/mi²), V* values would also be likely to remain above DC in Big Creek, due to similar issues with erodible soils on steep slopes.

In spite of ongoing efforts to curtail it, the observed motor vehicle use of Boneyard Meadow in TAD would likely continue to occur, which could cause recovery of the FAR stream reach to occur more slowly or could even cause the condition of the reach to deteriorate further.

Table 3- 84. Open and Closed Acres and Unauthorized Routes in RCAs

Analysis Unit	Acres within RCAs Open (ac) / Closed (ac)	Unauthorized Routes within RCAs Open (mi) / Closed (mi)	Stream Crossings on Unauthorized Routes Open (#) / Closed (#)
SFM	14486 / 7664	7.4 / 0	134 / 0
WES	26780 / 0	35.7 / 0	573 / 0
GLO	21340 / 10559	21.7 / 4.8	220 / 45
GAG	24970 / 0	24.3 / 0	395 / 0
MAM	21767 / 9	17.6 / 0	236 / 0
SSB	17105 / 5763	3.4 / 0.8	54 / 11
EKP	0 / 3432	0 / 8.4	0 / 89
JCH	21444 / 0	10.4 / 0	108 / 0
TAD	18345 / 18053	20.7 / 9.4	308 / 98
DNK	42255 / 6036	14.9 / 0	223 / 0
TOTAL	208492 / 51516	156.1 / 23.4	2251 / 243

Under existing regulations, cross-country motor vehicle use is permitted only when resource damage does not occur. This means that in Alternative 1, it would still be unauthorized for motor vehicles to cause deep rutting, direct streambank disturbance or other obvious damage to resources. Soil moisture conditions are variable and a key factor in whether or not resource damage occurs in a given location. For example, a vehicle may be able to drive across a meadow in September without causing resource damage (this would be allowed in Alternative 1), but may become stuck in mud in the same meadow in May. In May, motor vehicle use in such a meadow would be prohibited under this alternative.

Cross-country use would continue in most of the CARs. A portion (72 percent) of the Cow Creek CAR is in the area where cross-country travel would be prohibited, but the other CARs would be open to cross-country motor vehicle use. Table 3- 85 shows the acres in CARs, the number of miles of unauthorized routes in CARs and the numbers of stream crossings on the unauthorized routes in CARs that would continue to be open to use. The Lower San Joaquin River CAR (in MAM and JCH) and the Jose Basin CAR (in JCH) have the most unauthorized routes and crossings. The only unauthorized routes that would be closed in CARs are 0.7 mi with three stream crossings in the Cow Creek CAR. It would be difficult to ensure that impacts from this use are minimized, as required within CARs by the SNFPA ROD (USDA-FS 2004a).

Table 3- 85. Acres and Miles of Unauthorized Routes in CARs that would be Open to Continued Motor Vehicle Use

Analysis Unit	Acres within CARs Open (ac) / Closed (ac)	Unauthorized Routes within CARs Open (mi) / Closed (mi)	Crossings on Unauthorized Routes within CARs Open (#) / Closed (#)
SFM	0 / 0	0 / 0	0 / 0
WES	0 / 0	0 / 0	0 / 0
GLO	1199 / 0	0.6 / 0	2 / 0
GAG	478 / 0	0.2 / 0	0 / 0
MAM	10632 / 0	15.5 / 0	119 / 0
SSB	5 / 0	0 / 0	0 / 0
EKP	0 / 0	0 / 0	0 / 0
JCH	26350 / 0	14.6 / 0	68 / 0
TAD	2982 / 3153	2.8 / 0.7	6 / 3
DNK	2352 / 0	0 / 0	0 / 0
TOTAL	43,998 / 3153	33.7 / 0.7	195 / 3

In the long term, permitting cross-country motor vehicle use would likely lead to the proliferation of additional miles of unauthorized routes in those portions of the SNF currently open to cross-country use (see Chapter 1, Figure 1-3). We have seen changes in the unauthorized routes between the time they were mapped in 2005 and in 2008, with some routes apparently being abandoned and new routes developing. As the number of people participating in motorized recreation continues to increase, along with the capability of motor vehicles, the rate of development of new routes could even increase. We cannot accurately project the rate or the effects of route proliferation in the long term.

In conclusion, continued cross-country travel would have adverse effects to water resources including increased sediment loads, possible peak flow increases, streambank destabilization, and occasional oil and gas deposition into streams and riparian areas, due to the large number of miles of routes, stream crossings, and acres of area open to motor vehicle use in RCAs and CARs.

Additions to the NFTS

There would be no facilities added to the NFTS under this alternative, therefore there would be no direct or indirect effects to water resources.

Changes to the NFTS (changing vehicle class, season of use and opening or closing roads)

There would be no changes to the existing use periods of NFTS roads and trails; therefore there would be no direct effects to water resources. However, there would be indirect effects due to not making any changes, because the existing road restriction plan has many problems that have been identified over the years but have never been adequately addressed. These problems include specific roads that have been identified for restriction periods that are not currently included in the 1998 Road Closure Plan, as well as broader issues, such as that the Plan neglects to adequately reflect the actual accessibility of roads in the winter. Many roads that are not accessible in the winter because of snow are shown as open, so calculations of miles open in winter do not reflect roads that are actually travelable. Because the current plan assumes that many roads where winter travel is undesirable are not travelable and therefore not used, it is difficult to prevent undesirable use from occurring. Users trying to travel native surface roads into the fall when the roads are wet but not yet snowed under or in early season when the roads are

still partially snow covered and/or soft can cause extensive damage that increases maintenance needs and erosion. Combined with maintenance shortfalls, this means that erosion and sediment delivery result from this Plan. This would continue to occur over the long term, with chronic impacts to streams from increased peak flows and sediment delivery.

There are roads that should have restrictions in order to address specific resource concerns that have been identified through project planning (for example, roads identified to be contributing to watershed degradation during timber sale planning). These concerns would also not be addressed under this alternative.

The existing Road Restriction Plan would continue to provide year-round access to the Miami Motorcycle Area (in WES) on roads maintained for wet weather use. The use of these roads during the wet season produces some sediment, but is compliant with BMPs.

Use of the Bald Mountain NFTS motorized trail (in TAD) during the spring snowmelt period results in rutting of the road surface when tires break through melting snow and contact saturated soils. This is thought to increase the movement of sediment along the route and possibly also increases sediment delivery to streams. There is a location along the Bald Mountain motorized trail (route PK-01zd) where the route has captured streamflow and a gully has formed. The estimated volume of material eroded from the gully and delivered to an adjacent stream channel is 60 yd³ (the gully is approximately 100 ft long and averages 4 ft wide and 4 ft deep). A rehabilitation project was completed in 2008 to address this area. In order to prevent continued erosion of the gully and delivery of sediment to the channel, stream flow must be prevented from flowing down the route. The presence of a ford crossing, relatively flat terrain and proximity of the channel to the route makes it challenging to prevent stream capture by the route at this location.

Cumulative Effects

For the analysis of cumulative effects, the direct and indirect effects of this alternative were considered in combination with the past, present, and reasonably foreseeable actions listed in Appendix E, including grazing, timber management (Sugar Pine, Fish Camp, Dinkey North, Dinkey South, KREW Providence and KREW Bull, plantation maintenance and roadside hazard reduction), management and maintenance of NFTS facilities, continuing permitted special uses, and public recreation.

Cross-country use, including the use of unauthorized routes and areas, would continue and could expand in 96 HUC8s that are over the lower TOC, including seven that are over the TOC of 14 percent. Some of these are located in the Lower San Joaquin River CAR.

The risk of incurring a CWE response in the 25 HUC8s that were analyzed in detail would be the same as described in the Affected Environment section (see Table 3- 83). In the Miami area, NFTS roads that are open in the winter would provide wet-weather access to unauthorized routes, where use during wet soil conditions would render maintenance ineffective (as documented by the soils and watershed resources data collected for this project, available in the project record), and result in widespread erosion and sediment delivery. In Miami Creek, where CWEs are currently observed, channel condition would likely remain the same, with sediment filling pools and degrading aquatic habitat (the impacts on habitat are described more fully in the Aquatic Species section).

In considering the effects of this alternative in combination with the effects of past, present, and foreseeable actions, the cumulative effects are adverse, particularly in the eight HUC8s where the risk of CWEs is identified in Table 3- 83 as High or Moderate.

Compliance of Alternative 1 with the LRMP and Other Direction

This alternative does not comply with the LRMP (including RCOs) and other direction. Water quality and riparian/aquatic habitat would not be maintained or enhanced and BMPs would not be implemented. The number of miles of routes throughout the Forest, including in CARs, combined with the lack of maintenance and continuing traffic, would be likely to generate sediment that would be delivered to stream channels and affect water quality and stream channel condition. Meadows, streams and other hydrologically sensitive areas would be at risk for direct damage from cross-country motorized use. Roads with known impacts to watershed resources would continue to be managed without appropriate seasonal restrictions to minimize those impacts, in violation of standards and guidelines. Unmitigated use of unauthorized routes would continue to occur in 96 HUC8 watersheds that are over the lower TOC, seven of which are over the upper TOC. Some of these HUC8s (i.e., in Miami) have known CWEs occurring to which this use contributes. The analysis of this alternative was based on consideration of the best available science, including applicable peer-reviewed studies and local data.

The complete RCO Consistency Analysis is contained in Appendix J.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Prohibiting cross-country motorized use in the areas shown as ‘open’ to such use under the Direct / Indirect Effects of Alternative 1 (Table 3- 84) would mean that the entire SNF would allow motorized use only on designated routes and in designated areas. The acres, miles of unauthorized routes, and stream crossings in CARs shown in Table 3- 85 would also be closed, which is consistent with the management emphasis on aquatic species habitat protection in the CARs.

Impacts from motor vehicle use in RCAs would be only slightly reduced in the short term, since the unauthorized routes will still be present on the landscape and will not receive maintenance, rehabilitation or other work to reduce their impacts on streamflows and sedimentation. The effect of removing traffic could slightly reduce the amount of sediment generated from the routes and delivered to streams and would limit the deposition of chemical constituents from motor vehicles, including oil and grease, in these areas. Over time as the routes establish vegetation and other groundcover (duff, litter), runoff and erosion will diminish further. On some routes, recovery will achieve conditions similar to undisturbed areas within 5 to 30 years (see the Soils section). However, routes with severe erosion on steep slopes and erodible soils could continue to modify runoff and erosion patterns even in the long term. Although a complete inventory of route conditions has not been conducted on every unauthorized route, based on the routes that were visited (approximately 200 miles, or 36 percent of the total miles of routes), the majority of routes with severe erosion of this type appear to be in WES. JCH also contains some eroding routes that are of concern due to their potential impacts to the Jose Basin CAR.

There is a considerable benefit to water resources from the prohibition of cross-country travel.

Additions to the NFTS

The miles of routes and acres of areas added in RCAs and the number of added stream crossings are shown in Table 3- 86. Due to the addition of unauthorized routes, the increase in the density of NFTS facilities in the RCA and in stream crossings would be the greatest in WES, where the increases are double those in any other analysis unit. The only area added in this alternative is in

TAD. Approximately half of the area is located in the RCA. However, field evaluations documented that the area does not appear to be impacting the adjacent riparian areas nor is it in conflict with RCOs.

Table 3- 86. Number and Density of Routes in RCAs and Stream Crossings and Acres of Added Areas in RCAs

These metrics are based on GIS analysis. Stream crossings include perennial, intermittent and ephemeral streams, some of which are actually unscoured swales

Analysis Unit	Routes Added in RCA (mi)	Added route density in RCA (mi / mi ²)	Added crossings (#)	Added crossing density (# / mi ²)	Added Areas in RCA (ac)
SFM	0	0	8	0.0	0
WES	4.4	0.10	136	1.0	0
GLO	0.4	0.01	7	0.05	0
GAG	0.9	0.02	11	0.08	0
MAM	0	0	0	0	0
SSB	0	0	0	0	0
EKP	0	0	0	0	0
JCH	0.6	0.02	3	0.04	0
TAD	3.2	0.05	68	0.4	3.1
DNK	0.3	0.00	2	0.0	0
TOTAL / AVERAGE	9.7	0.02	235	0.2	3.1

Comparing the information presented in Table 3- 86 to the existing condition (which also represents the effects of Alternative 1) presented in Table 3- 78 and Table 3- 79, the miles of routes added in RCAs would increase the miles of NFTS roads and trails in RCAs by less than 1 percent and would increase the number of stream crossings on NFTS roads and trails by 1.6 percent (there are currently 1008 miles of NFTS roads and trails in RCAs, and 14,611 stream crossings on NFTS roads and trails). There are 170 miles of unauthorized routes in RCAs and 2259 stream crossings on unauthorized routes that would not be added to the NFTS in this alternative.

Field visits were made to each added route in an RCA or with a stream crossing. The prescriptive actions specified in Appendix A address every concern that was identified. Since these actions must be completed before these segments can open to public use, the impacts to surface water and riparian areas will be minimized prior to the addition of these routes. The specified improvements ensure consistency with direction, including RCOs.

Using the field data, the cumulative length/area of erosion features identified and needing repair were estimated and are displayed in Table 3- 87. The eroding length/area are compared to the total length/area being added to the NFTS to determine the percentage of erosion occurring. As shown in the table, 28 percent of the added roads, 34 percent of the added trails and none of the added areas are currently eroding. Most of the erosion will be remedied with the construction of appropriate surface drainage structures (see prescriptive actions for issue codes SW-2, SW-3, and SW-4 in Appendix A). Other common needs include the repair of surface erosion (SW-14) and improvement of stream crossings (SW-8 and SW-9). The prescriptive actions are expected to minimize the concentration of runoff, erosion, sediment delivery and impacts to riparian areas and stream channels.

Table 3- 87. Miles of Routes and Acres of Areas with Known Erosion Features Added to the NFTS in Alternative 2

Analysis Unit	Added Roads total mi / eroding mi / % eroding	Added Trails total mi / eroding mi / % eroding	Added Areas total ac / eroding ac / % eroding
SFM	0.9 / 0.8 / 80%	0.7 / 0.3 / 38%	0 / 0 / 0%
WES	0 / 0 / 0%	24.2 / 9.2 / 38%	0 / 0 / 0%
GLO	0.3 / 0 / 0%	1.9 / 0.8 / 42%	0 / 0 / 0%
GAG	0 / 0 / 0%	2.3 / 0.7 / 29%	0 / 0 / 0%
MAM	0 / 0 / 0%	0 / 0 / 0%	0 / 0 / 0%
SSB	0.03 / 0 / 0%	0 / 0 / 0%	0 / 0 / 0%
EKP	0 / 0 / 0%	0 / 0 / 0%	0 / 0 / 0%
JCH	0 / 0 / 0%	1.9 / 1.6 / 84%	0 / 0 / 0%
TAD	2.8 / 0.3 / 12%	10.9 / 1.4 / 13%	6.1 / 0 / 0%
DNK	0.6 / 0.2 / 34%	0.3 / 0.2 / 52%	0 / 0 / 0%
TOTAL/AVERAGE%	4.6 / 1.3 / 28%	42.2 / 14.2 / 34%	6.1 / 0 / 0%

The field data was also used to identify locations where stream channels are diverted along the route or have the potential to be diverted along the route in the near future. Table 3- 88 shows that there are two locations on trails added in this alternative where stream channel diversions are occurring, as well as two locations on added roads and two on added trails with the potential to divert streams in the near future. The prescriptive actions specified in Appendix A address these locations, so that when these routes are added to the system there will be no diversions occurring and the potential for new ones will be minimized.

Table 3- 88. Number of Documented Stream Channel Diversions and Potential Diversion Locations Added to the NFTS in Alternative 2.

Analysis Unit	Added Roads diversions / potential	Added Trails diversions / potential
SFM	0 / 1	0 / 0
WES	0 / 0	2 / 2
GLO	0 / 0	0 / 0
GAG	0 / 0	0 / 0
MAM	0 / 0	0 / 0
SSB	0 / 0	0 / 0
EKP	0 / 0	0 / 0
JCH	0 / 0	0 / 0
TAD	0 / 0	0 / 0
DNK	0 / 1	0 / 0
TOTAL	0 / 2	2 / 2

Some routes have more unique needs; those that are crucial for consistency with the LRMP and other direction are listed here: there are two routes that need measures in addition to standard drainage and crossing improvements to prevent the delivery of sediment to perennial streams (WES); one that needs to have a crossing relocated to avoid impacts to the riparian area (GAG); one that needs measures to prevent traffic into a meadow (TAD); and one that needs measures to prevent the deposition of sediment in a meadow (DNK).

The adverse effects of adding these routes and areas to the NFTS is very small compared to the total effect of the entire NFTS and to the benefit gained from prohibiting cross-country travel.

Changes to the NFTS (changing vehicle class, season of use and opening or closing roads).

Changing vehicle class between highway-legal vehicles, all vehicles and vehicles less than 50” are assumed to have no effect on the impacts of the NFTS and are therefore not considered in the water resources analysis (see Assumptions in section 3.10.1).

Seasonal closures during the winter period would be increased on 793 mi and decreased on 192 mi of NFTS roads. The types of changes are characterized in Table 3- 89 to show the number of days the closure periods would change. Roads characterized as having a ‘winter closure’ are restricted from 15-Dec (or earlier) through 1-Apr (or later). Roads that are closed year-round are included in these figures; for example, a road that was previously prohibited year-round that is now open for part of the year would show up in the ‘Modified >30 days shorter’ category.

Other than the miles of roads appearing in the ‘Removed’ column, all of these roads are closed from at least 15-Dec (many close earlier) to at least 1-Apr (many remain closed until later). The changes that are less than 15 days were generally made only to improve the manageability of the closure plan – the ranges were consolidated to allow for more consistency and fewer different days when roads open and close. Changes between 16 and 30 days were generally modifications to better reflect the snowmelt and/or moisture conditions of the roads and to provide opening dates in the spring that are appropriate for the area. Changes that are more than 30 days were made when winter closures were combined with closures for wildlife, which were either added or removed based on a complete review of roads with respect to the LRMP and other direction for wildlife protection (see the Wildlife 3.13. and Aquatic Biota 3.14. for more information on wildlife restrictions) or when roads were previously closed year-round and would be open for part of the year under this alternative.

The overall effects of these changes would provide increased protection against sediment generated by traffic on wet roads, rutting of the road, and the breakdown of the road surface drainage improvements that minimize sediment production and hydrologic connectivity. All of the changes, except for the 5.4 miles where the closures would be removed, provide minimum protection from road surface deformation, sediment generation, and sediment delivery associated with wet weather use. Longer closures also protect against early season storms and provide a longer window for roads to dry prior to opening in the spring.

The 5.4 miles that have had a winter restriction removed include 2.1 miles of paved or graveled roads and 3.3 miles of native surface roads. Paved and graveled roads are designed for wet weather use and generally withstand deformation and erosion such as occurs on native surface roads. About half of the miles of native surface roads shown as having a winter closure removed in this alternative would not be accessible during the winter due to restrictions on the roads that access them. Of the roads that would be accessible, 1.1 miles are located outside of RCAs and therefore have a moderate risk of delivering sediment to streams. The change that could result in increased impacts to watershed resources due to the removal of the winter closure is the removal of the winter restriction on a segment of 9S06, which is located in the RCA of the Jose Basin CAR. Motor vehicle use of this road during the wet season could result in road surface deformation, increased erosion, and increased sediment delivery into the adjacent stream, which is tributary to Jose Creek. This road would require surfacing, which is scheduled to occur in 2010, in order to meet BMPs and to be consistent with RCOs.

Table 3- 89. Miles of Changes to Winter Season Road Restrictions, Including Roads Closed Year-round in Alternative 2

Analysis Unit	Change in Winter Closure Period								Total Changes (mi)
	New (mi)	Modified <= 15 days longer (mi)	Modified 16 - 30 days longer (mi)	Modified >30 days longer (mi)	Modified <= 15 days shorter (mi)	Modified 16 - 30 days shorter (mi)	Modified >30 days shorter (mi)	Removed (mi)	
SFM	17.9	0	0	0	0	0	1.5	0	19.4
WES	14.5	0	0	7.2	0	0	6.7	0.2	28.6
GLO	0.1	0	0	9.8	0	0	14.0	0.5	24.4
GAG	9.2	0.3	0	6.1	0	0	4.3	1.4	21.3
MAM	2.4	0	0	12.4	0	0	7.4	0.9	23.1
SSB	7.3	0	0.2	134.1	0	9.1	47.6	1.0	199.3
EKP	0	0	0	51.5	0	0	0.7	0	52.3
JCH	13.5	0	0	34.4	0	0	8.4	0.4	56.7
TAD	47.1	0	2.8	181.0	0.7	21.2	23.5	0.7	276.9
DNK	67.7	0	17.0	156.0	7.0	2.2	31.9	0.3	282.1
TOTAL	179.8	0.3	20.0	592.5	7.7	32.5	146.0	5.4	984.2

New = road was previously not restricted in winter; Modified, longer = restriction period is being extended; modified, shorter = restriction period is being shortened; Removed = road was previously restricted in winter, would be opened during that time.

Year-round restrictions would be changed on 209 miles of roads, with 5.5 miles of previously closed roads being opened seasonally and 204 miles of roads previously open at least part of the year being prohibited year-round.

Table 3- 90 shows the total miles of NFTS roads and motorized trails in RCAs that would be open year-round and closed year-round and the numbers of stream crossings on roads and motorized trails open year-round and closed year-round. The stream crossings are displayed to indicate the number inside the RCA and those outside the RCA. Refer to the discussion of the delineation of RCAs in section 3.10.2 for clarification.

Table 3- 90. Alternative 2 – Miles of NFTS Roads and Motorized Trails Open Year-round in RCAs, Miles of Roads and Motorized Trails Closed Year-round in RCAs and Numbers of Stream Crossing on those Roads and Motorized Trails

Analysis Unit	NFTS Roads and Motorized Trails Open Year-round in RCA (mi)	Crossings Open Year-round (# in RCA / # outside RCA / total #)	NFTS Roads and Motorized Trails Closed Year-round in RCA (mi)	Crossings Closed Year-round (# in RCA / # outside RCA / total #)
SFM	23	177 / 275 / 452	6	48 / 16 / 64
WES	79	549 / 655 / 1204	11	80 / 49 / 129
GLO	125	747 / 449 / 1196	14	85 / 78 / 163
GAG	53	420 / 477 / 897	13	78 / 121 / 199
MAM	30	147 / 213 / 360	6	35 / 59 / 94
SSB	5	31 / 11 / 42	9	61 / 31 / 92
EKP	0.4	2 / 2 / 4	0.3	0 / 0 / 0
JCH	12	59 / 45 / 104	10	35 / 12 / 47
TAD	6	64 / 16 / 80	27	178 / 39 / 217
DNK	36	250 / 194 / 444	32	285 / 72 / 357
TOTAL:	370	2446 / 2337 / 4783	129	885 / 477 / 1362

Comparing Table 3- 90 (Alternative 2) to Table 3- 82 (existing conditions) note that the miles of roads and motorized trails in RCAs that would be open year-round is less than half as many as are currently open (370 miles in Alternative 2, 774 miles currently in Alternative 1). The miles in RCAs that would be closed year-round (129 miles) is about 60 percent greater than what is currently closed (80 miles). The numbers of stream crossings open year-round would be reduced by almost 50 percent, from 8561 to 4783, while the number of crossings closed year-round would increase 40 percent, from 793 to 1362. This means that the overall potential for erosion and sediment delivery will be greatly reduced. There would be a beneficial effect on water resources due to greater protection of roads when wet, since the miles of roads with winter restrictions and miles of roads prohibited year-round both increase under this alternative. However, there would be no change in the year-round use of the Bald Mountain OHV Route and the impacts to the segment near PK-01zd would continue to affect both erosion of the route and water quality of the adjacent stream.

Cumulative Effects

For the analysis of cumulative effects, the direct and indirect effects of this alternative were considered in combination with the past, present, and reasonably foreseeable actions listed in Appendix E, including grazing, timber management (Sugar Pine, Fish Camp, Dinkey North, Dinkey South, KREW Providence and KREW Bull, plantation maintenance and roadside hazard reduction), management and maintenance of NFTS facilities, continuing permitted special uses,

and public recreation. The ERA model also accounted for the disturbances of past, present, and reasonably foreseeable future actions in each subdrainage.

Thirteen HUC8s that are either over the lower TOC or have stream channel conditions that indicated concern for CWEs were evaluated in the Detailed CWE Assessment for Alternative 2. The Detailed CWE Assessment concluded that there would be a Low risk of CWEs in nine HUC8s, a Moderate risk in two and a High risk in two. The determination of risk for each subdrainage assumes that the specified design features have been implemented. The Moderate and High risk subdrainages are in the Miami HUC6 subwatershed. Table 3- 91 compares the risk of CWEs in this alternative to the risk in Alternatives 1 and 3.

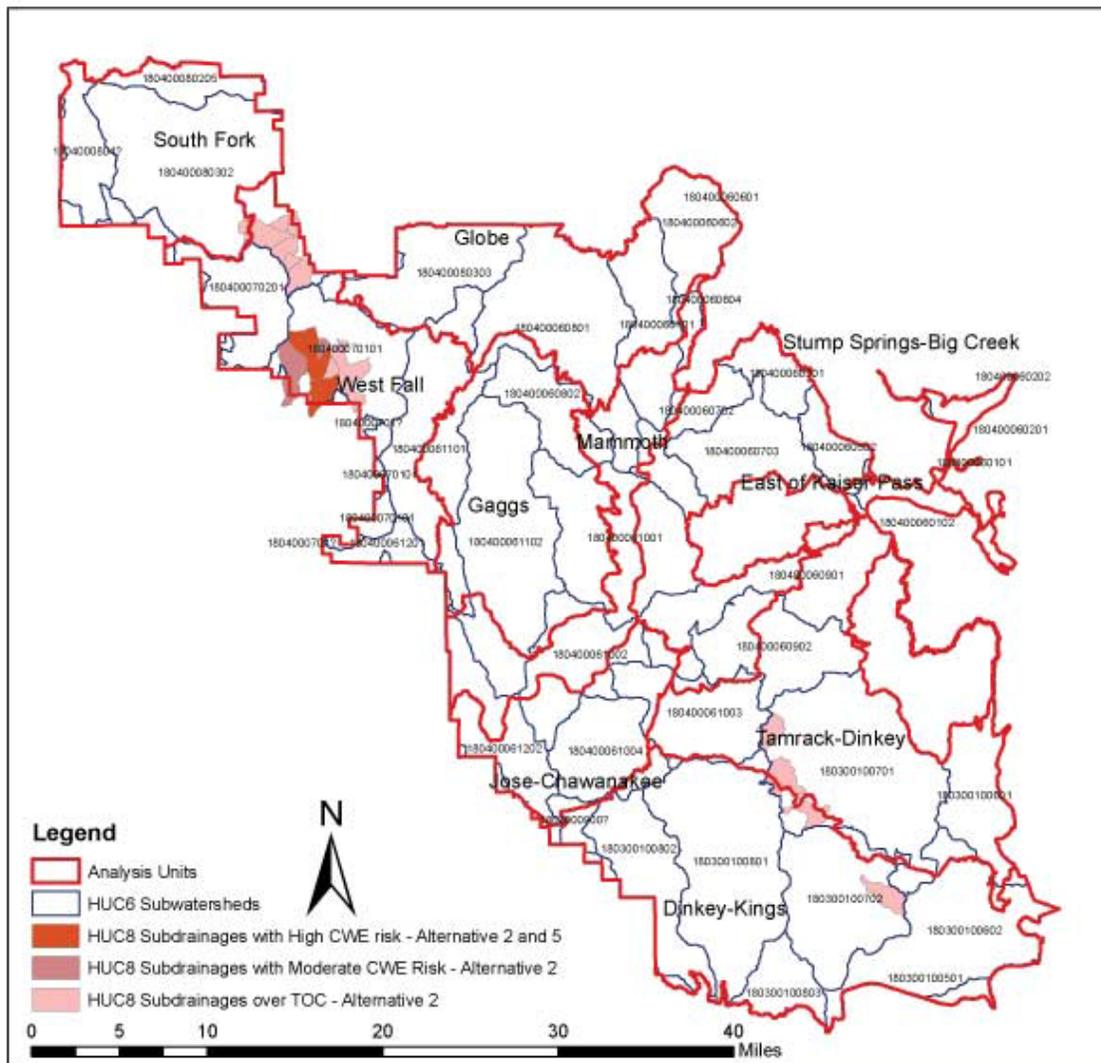
Because the risk of CWEs in Alternative 1 includes continued cross-country vehicle travel, while Alternative 3 does not allow cross-country travel and adds no facilities to the NFTS, these two alternatives define the greatest risk of CWEs (Alternative 1) and the lowest risk (Alternative 3). Comparing Alternative 2 to these alternatives shows where the effects of this alternative differ from these reference points. In the subdrainages where the risk is the same for Alternatives 2 and 3, this indicates that the routes and areas added in Alternative 2 do not substantially increase the risk of CWEs over the risk that exists when adding none. There are four subdrainages (503.0003, 503.0052, 503.0053, and 503.0054) where the risk of CWEs is elevated when compared to Alternative 3 (adding no routes or areas); in three of these, the risk is similar to the risk for Alternative 1. For example, subdrainage 503.0003 has a Moderate risk in Alternatives 1 and 2, but a Low risk in Alternative 3. However, in 503.0052, the risk is High in Alternative 1, Moderate in Alternative 2, and Low in Alternative 3, which indicates that there is a benefit from prohibiting cross-country travel but an impact from the specific unauthorized routes proposed to be added in that subdrainage in this alternative. There are four subdrainages (501.4003, 503.0002, 503.0052, and 519.3053) where the risk of CWEs in this alternative are lower than for Alternative 1, and nine where the risk is the same. There are also nine subdrainages where the risk is the same for Alternative 2 and Alternative 3.

Table 3- 91. HUC8 Subdrainages Evaluated in the Detailed Cumulative Watershed Effects Assessment that have Additions to the NTFS in Alternative 2 – Risk of CWEs Compared to Alternatives 1 and 3

Analysis Unit	HUC8 #	Risk of CWEs		
		Alt 1	Alt 2	Alt 3
WES	501.4002	Low	Low	Low
	501.4003	Moderate	Low	Low
	501.5101	Low	Low	Low
	503.0002	Moderate	Low	Low
	503.0003	Moderate	Moderate	Low
	503.0052	High	Moderate	Low
	503.0053	High	High	Moderate
	503.0054	High	High	Moderate
TAD	503.0055	Low	Low	Low
	520.0017	Low	Low	Low
	520.3002	Low	Low	Low
	520.5001	Low	Low	Low
DNK	519.3053	High	Low	Low

Figure 3- 15. Subdrainages (HUC8s) containing routes or areas included in Alternative 2 that were evaluated in the Detailed Assessment

Those determined to have a High risk of a CWE response are shaded darker.



The HUC8s evaluated in the Detailed CWE Assessment are listed in Table 3- 92 and the HUC6 subwatersheds that they are within are also displayed. If there are features being added to the NFTS that, based on field data, are contributing sediment to stream channels in these HUC8s (which is contributing to the potential for CWEs), they are also identified.

Table 3- 92. Subdrainages with Additions to the NTFS in Alternative 2 that were Evaluated in the Detailed CWE Assessment

Analysis Unit	Subdr #	Lower TOC ERA%	Alt 2 ERA %	Risk of CWEs	Alt2 stream crossings	Contributing Routes and /or Areas ¹	HUC6
WES	501.4002	4	7.5	Low	20	TH-41y, TH-67y, TH-68z	1804000 80302 W SFk Merced
	501.4003	4	8.0	Low	4	TH-67z, TH-68z	
	501.5101	4	11.6	Low	2	none	
	503.0002	4	3.1	Low	0	none	1804000 70101 Miami
	503.0003	5	3.6	Moderate	13	PK11a, PK24, PK25	
	503.0052	4	5.6	Moderate	9	none	
	503.0053	4	2.2	High	40	PK-5, SR-21z	
	503.0054	4	4.4	High	16	JM-7ay, SR-35z, SR-92	
503.0055	4	8.0	Low	23	JM-2y, JM-20y, JM-21y, SV31		
TAD	520.0017	4	6.7	Low	2	none	1803001 007001 Upper Dinkey
	520.3002	5	7.3	Low	1	none	
	520.5001	5	5.0	Low	10	none	
DNK	520.0056	5	13.9	Low	0	none	1803001 00702 Lower Dinkey

¹Routes and areas located within these subdrainages that are either not eroding or do not have potential to deliver eroded material to the stream network, based on field observations, are not listed here.

The routes listed in Table 3- 92 each have actions specified (Appendix A and project record) that are designed to bring the routes to standard and to achieve consistency with RCOs. Several routes being added in the West South Fork Merced HUC6 need work to prevent them from delivering excess sediment to stream channels. Based on stream channel conditions and the work specified for the routes in these areas, the risk of CWEs resulting from the addition of these routes was determined to be low. Although routes are being added in HUC8s that are over TOC in TAD and DNK, none of the routes were found to be contributors to potential CWEs.

The Miami HUC6 is the area with the most added routes contributing to potential CWEs. The work specified in Appendix A for these routes may be costly and challenging to achieve for all of the routes in 503.0003, 503.0053, 503.0054, and 503.0055. Based on existing information about the condition of Miami Creek and documented erosion and sediment delivery from these trails, there are CWEs currently occurring in Miami Creek itself, and these trails are likely contributors. The amount that the routes are contributing to CWEs has not been determined. However, by taking actions to bring them to standards, their contribution of runoff and sediment will be decreased in this alternative, relative to their present condition and relative to Alternative 1.

Considering past, present, and reasonably foreseeable actions, this alternative would not result in an increased risk of CWEs, and no cumulative adverse impacts, compared to Alternative 1. The

overall cumulative effect would be beneficial due to the direct and indirect benefits resulting from the prohibition of cross-country motor vehicle travel and the changes to the NFTS. In the Miami Creek area, the beneficial effect is slightly lower than it is in Alternative 3 due to the location and condition of several of the motorized trails being added to the NFTS in this alternative.

Compliance of Alternative 2 with the LRMP and Other Direction

This alternative complies with the LRMP (including the SNFPA) and other direction. The prohibition of cross-country motor vehicle use would reduce the amount of sediment generated on unauthorized routes. Unauthorized routes would recover over the long term. Meadows, streams and other hydrologically sensitive areas would have a reduced risk for direct damage in the absence of cross-country motor vehicle use and because unauthorized routes and areas that impact meadows and other riparian areas would cease to be used and would recover over time. See the Soil Resource section for a discussion of passive recovery of unauthorized routes. Only selected routes would be added to the system and these would be brought up to standards, including the application of BMPs to minimize their effects to peak flows and sediment delivery and made consistent with RCOs. No routes in meadows or CARs would be added to the NFTS. The season of use of more roads would be consistent with BMPs and would provide protection against road surface deformation, flow concentration, erosion and sediment delivery. There is 0.4 mile of 9S06, located in the RCA of the Jose Basin CAR, where winter season use will not be consistent with BMPs or RCOs until this road segment is graveled, which is scheduled to occur in 2010. Direction in the SNFPA to identify restoration opportunities (S&G #122) has been applied to the routes that were inventoried, but active restoration would not occur as a result of this alternative.

The analysis of this alternative was based on consideration of the best available science, including applicable peer-reviewed studies and local data.

The complete RCO Consistency Analysis is contained in Appendix J.

Alternative 3

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The effects of prohibiting cross-country motor vehicle travel would be the same as described under Alternative 2.

Additions to the NFTS

There would be no routes or areas added to the NFTS. The number of miles of eroding routes added, the number of routes added in RCAs and the number of stream crossings added would all be zero, and there would be no direct or indirect effects to water resources.

Changes to the NFTS (changing vehicle class, season of use and opening or closing roads)

There would be no changes to the NFTS. The effects would be the same as described for Alternative 1.

Cumulative Effects

For the analysis of cumulative effects, the direct and indirect effects of this alternative were considered in combination with the past, present, and reasonably foreseeable actions listed in Appendix E, including grazing, timber management (Sugar Pine, Fish Camp, Dinkey North, Dinkey South, KREW Providence and KREW Bull, plantation maintenance and roadside hazard reduction), management and maintenance of NFTS facilities, continuing permitted special uses, and public recreation. The ERA model also accounted for the disturbances of past, present, and reasonably foreseeable future actions in each subdrainage.

Cumulative watershed effects will be reduced by the prohibition of cross-country travel, which will result in the elimination of unauthorized routes. No facilities would be added in any HUC8 subdrainage. The unauthorized routes will naturally recover over time as they become revegetated and soil cover is established. See the soil section for a discussion of passive recovery of unauthorized routes. Sediment will be reduced and channel conditions, including aquatic habitat conditions, will improve. The ERA values in the 96 HUC8s that are over their respective lower TOC ERA values would be reduced by 0.01 percent to 2.37 percent in the long term. Some of these subdrainages will continue to have a potential for CWEs to result from other activities. The Miami Creek HUCs including 503.0002, 503.0003, 503.0052, 503.0053 and 503.0054 will be the most affected from natural recovery of unauthorized routes. However, some of the unauthorized routes have resulted in severe gully erosion of up to 3 feet deep. These routes will require watershed restoration in order to return them to full productivity and reduce erosion and sedimentation into the Miami Creek channel system.

The risk of CWEs would be low in 21 HUC8s, moderate in three and high in one. The HUC8 with a high risk of CWEs is 504.2251, where the ERA value in Alternative 3 would be 22.25 percent. These high ERAs result from other disturbances in the area and are not attributable to this project. The risk of CWEs under this alternative is compared to the risk determined for Alternative 1 in Table 3- 93, which shows that the risk in this alternative would be reduced relative to Alternative 1 in nine HUC8s. In 16 of the 25 HUC8s analyzed in the Detailed Assessment, the risk of CWEs would be essentially the same as the risk for Alternative 1. This indicates that the unauthorized routes (which would be open in Alternative 1 but closed in Alternative 3) in those 15 subdrainages do not substantially contribute to the risk of CWEs. Because the risk of CWEs in Alternative 1 includes continued cross-country vehicle travel, while Alternative 3 does not allow cross-country travel and adds no facilities to the NFTS, these two alternatives define the greatest risk of CWEs (Alternative 1) and the lowest risk (Alternative 3).

Table 3- 93. HUC8 Subdrainages Evaluated in the Detailed Cumulative Watershed Effects Assessment that have Additions to the NTFS in Alternative 3 – Risk of CWEs Compared to Alternative 1

Analysis Unit	HUC8 #	Risk of CWEs	
		Alt 1	Alt 3
WES	501.0023	Low	Low
	501.4002	Low	Low
	501.4003	Moderate	Low
	501.5101	Low	Low
	503.0002	Moderate	Low
	503.0003	Moderate	Low
	503.0006	Low	Low
	503.0011	Low	Low
	503.0052	High	Low
	503.0053	High	Moderate
	503.0054	High	Moderate
	503.0055	Low	Low
	503.0056	Low	Low
	503.3051	Moderate	Low
GAG	504.2008	Low	Low
	504.2102	Low	Low
	504.2151	Low	Low
	504.2251	High	High
TAD	520.0017	Low	Low
	520.0056	Low/Mod	Low
	520.5001	Low	Low
DNK	520.3002	Low	Low
	520.3003	Moderate	Moderate
	519.3053	High	Low
	519.4051	Low	Low

Considering past, present, and reasonably foreseeable actions, this alternative would not result in an increased risk of CWEs, and no cumulative adverse impacts. The overall cumulative effect would be beneficial due to the direct and indirect benefits resulting from the prohibition of cross-country motor vehicle travel.

Compliance of Alternative 3 with the LRMP and Other Direction

This alternative is consistent with the LRMP and other direction, including RCOs. Discontinuing cross-country use across the SNF would prevent ongoing impacts from continued motor vehicle use on the unauthorized routes as well as across the landscape and would reduce the risk of damage to riparian areas and stream channels from cross-country use. No facilities would be added to the NTFS. The season of use of all NTFS roads would remain unchanged. Direction in the SNFPA to identify restoration opportunities has been applied to the routes that were unauthorized, but active restoration would not occur.

The analysis of this alternative was based on consideration of the best available science, including applicable peer-reviewed studies and local data.

Alternative 4

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The effects of prohibiting cross-country motor vehicle travel would be the same as described under Alternative 2.

Additions to the NFTS

The miles of routes added in RCAs, acres of areas added in RCAs and the number of added stream crossings are shown in Table 3- 94. The additions, in comparison to the existing condition / effects of Alternative 1, are very similar to Alternative 2. Adding 11.2 miles in RCAs is very small, compared to the 1008 miles of NFTS roads and trails currently in RCAs, and compared to the total of 179 miles of unauthorized routes in RCAs (168 miles of which would not be authorized in this alternative). The added densities in RCAs are less than 0.1 mi/mi² in all analysis units. The largest increases in both RCA density and stream crossing density would occur in GAG and WES. Areas would be added in the RCA in TAD and DNK, and 3.3 acres would be added to the 25.8 acres of Open Areas, parking and staging areas already in the NFTS. The areas in DNK could contribute to flow increases and sediment delivery to Summit Creek. Motor vehicle use would not be permitted within 100 ft of the creek (see Appendix A) and the area would be monitored in order to determine whether additional measures are needed. In Table 3- 94, the metrics are based on GIS analysis. Stream crossings include perennial, intermittent and ephemeral streams, some of which are actually unscoured swales.

Table 3- 94. Number and Density of Routes in RCAs and Stream Crossings and Acres of Added Areas in RCAs

Analysis Unit	Routes Added in RCA (mi)	Added route density in RCAs (mi / mi ²)	Added crossings (#)	Added crossing density (# / mi ²)	Added Areas in RCA (ac)
SFM	0.8	0.02	14	0.1	0
WES	3.2	0.07	53	0.4	0
GLO	1.5	0.03	18	0.1	0
GAG	3.1	0.08	56	0.4	0
MAM	0	0	0	0	0
SSB	0.1	0	3	0	0
EKP	0.1	0	1	0	0
JCH	0	0	0	0	0
TAD	2.0	0.03	43	0.2	3.2
DNK	0.3	0	0	0	0.1
TOTAL / AVERAGE	11.2	0.03	188	0.2	3.3

As shown in Table 3- 95, 17 percent of the added roads, 21 percent of the added trails and 1 percent of the added areas are currently eroding. Most of the erosion will be remedied with the construction of appropriate surface drainage structures (see prescriptive actions for issue codes SW-2, SW-3, SW-4 in Appendix A). Other common needs include the repair of surface erosion (SW-14) and improvement of stream crossings (SW-8 and SW-9). The prescriptive actions are

expected to minimize the concentration of runoff, erosion, sediment delivery and impacts to riparian areas and stream channels.

Table 3- 95. Miles of Routes and Acres of Areas with Known Erosion Features Added to the NFTS in Alternative 4

Analysis Unit	Added Roads total mi / eroding mi / percent eroding	Added Trails total mi / eroding mi / percent eroding	Added Areas total ac / eroding ac / percent eroding
SFM	0.3 / 0.02 / 6 %	2.2 / 0.3 / 12 %	0 / 0 / 0 %
WES	2.4 / 0.5 / 22 %	11.0 / 3.4 / 31 %	24.9 / 0.2 / 1 %
GLO	0 / 0 / 0 %	4.8 / 1.3 / 28 %	0 / 0 / 0 %
GAG	1.9 / 0.2 / 10 %	13.1 / 2.2 / 17 %	0.5 / 0 / 0 %
MAM	0.1 / 0 / 0 %	1.0 / 0.1 / 10 %	0 / 0 / 0 %
SSB	0.7 / 0 / 0 %	0 / 0 / 0 %	0 / 0 / 0 %
EKP	0.8 / 0 / 0 %	0 / 0 / 0 %	0.3 / 0 / 0 %
JCH	0 / 0 / 0 %	0 / 0 / 0 %	0 / 0 / 0 %
TAD	1.7 / 0.6 / 36 %	12.4 / 1.9 / 15 %	9.6 / 0 / 0 %
DNK	0.2 / 0 / 0 %	0.3 / 0.1 / 52 %	0.3 / 0 / 0 %
TOTAL/AVERAGE%	8.2 / 1.4 / 17 %	44.7 / 9.3 / 21 %	35.6 / 0.2 / 1 %

Table 3- 96 shows that there are five locations on trails added in this alternative where stream channel diversions are occurring, as well as one location on added trails and three on added roads with the potential to divert streams in the near future. The prescriptive actions specified in Appendix A will address these locations, so that when they are added to the system there will be no diversions occurring and the potential for new ones will be minimized.

Table 3- 96. Number of Documented Stream Channel Diversions and Potential Diversion Locations Added to the NFTS in Alternative 4

Analysis Unit	Added Roads diversions / potential	Added Trails diversions / potential
SFM	0 / 0	0 / 1
WES	0 / 0	0 / 0
GLO	0 / 0	0 / 0
GAG	0 / 0	3 / 0
MAM	0 / 0	0 / 0
SSB	0 / 0	0 / 0
EKP	0 / 0	0 / 0
JCH	0 / 0	0 / 0
TAD	0 / 2	2 / 0
DNK	0 / 1	0 / 0
TOTAL	0 / 3	5 / 1

The effects of these additions of roads, trails and areas to the NFTS are slightly adverse to neutral, given the small magnitude in relation to the total NFTS, and the prescriptive actions that will be implemented.

Changes to the NFTS (changing vehicle class, season of use and opening or closing roads)

Changing vehicle class between highway-legal vehicles, all vehicles and vehicles less than 50" are assumed to have no effect on the impacts of the NFTS and are therefore not considered in the water resources analysis (see Assumptions in section 3.10.1).

Seasonal closures during the winter period would be increased on 1687 miles and decreased on 150 miles of NFTS roads, as shown in Table 3- 97. The effects of these changes would be similar to the effects described for Alternative 2, except that in this alternative, more miles of roads have longer closures which provide added protection against the impacts of wet weather road use on more miles of roads. All of these roads, except for the Bald Mountain OHV Route and the 0.7 miles with the closure removed, provide a minimum closure period of 15-Dec to 1-April, which will provide some protection against road damage and resulting erosion and sedimentation. The closure periods for each road were developed in consideration of the expected time that the roads become saturated and the time that they become dry in the spring, in addition to other resource needs. The reasons for modifying opening and closing dates are the same as described in Alternative 2.

Of the 0.7 miles with the winter closure removed, 0.3 mi is an aggregate surface road that lies within RCA and accesses private property. While there is a risk of some sediment generation due to wet season traffic in the RCA, the aggregate surfacing minimizes this risk and meets BMPs. The remaining 0.4 mi is a segment of road 9S06, which is a native surface road located in the RCA of the Jose Basin CAR. Opening this road segment to wet season traffic will increase the risk of road erosion and sediment introduction into the adjacent stream, which is tributary to Jose Creek. Until this road segment is surfaced (i.e., graveled) in 2010, this action is not compliant with BMPs or consistent with RCOs.

The increased closures also include a spring snowmelt closure that would be added to the Bald Mountain OHV Route (a NFTS motorized trail), which would be restricted from 1-April to 20-May. This would protect the route from damage that occurs when tires break through melting snow and rut the saturated road surface, while still providing for over-snow recreation until 1-April. This is expected to reduce the amount of sediment movement along the route and into stream channels, including ephemeral channels, and also to minimize stream bank deformation and the risk of stream capture at the diversion / gully location near PK-01zd. (Although much of the Bald Mountain Route lies on granite, it is not possible to protect the portions on soils while still allowing use of the granite areas.)

It is noteworthy that opening road 11S051 (in DNK) from 15-June to 15-October could have potential negative impacts on water resources. This road has been closed year-round for resource reasons. Current information on road condition, erosion and sediment delivery to streams is not available. Any increase in erosion and sediment delivery due to the addition of traffic would be minimized by maintaining the winter season closure.

Table 3- 97. Miles of Changes to Winter Season Road Restrictions in Alternative 4, Including Roads Closed Year-round

Analysis Unit	Change in Winter Closure Period								Total Changes (mi)
	New (mi)	Modified >= 15 days longer (mi)	Modified 16 - 30 days longer (mi)	Modified >30 days longer (mi)	Modified <= 15 days shorter (mi)	Modified 16 - 30 days shorter (mi)	Modified >30 days shorter (mi)	Removed (mi)	
SFM	23.5	4.0	0	0	0	0	1.5	0	29.0
WES	53.9	0	0	95.0	0	0	2.4	0	160.5
GLO	55.7	0	0	293.5	0	0	3.8	0	353.0
GAG	44.9	0	0	136.2	0	0	3.0	0.3	184.5
MAM	24.7	0	0	66.8	0	0	0.5	0	92.0
SSB	20.0	37.5	4.2	135.5	0	9.1	43.7	0	250.0
EKP	2.7	0	0	54.0	0	0	0.2	0	56.9
JCH	15.6	12.1	0	33.4	0	0	8.4	0.4	69.9
TAD	55.7	23.6	2.8	188.3	0	7.7	18.3	0	296.4
DNK	82.1	25.5	26.5	160.0	1.3	3.2	46.4	0	345.0
TOTAL	378.8	111.8	33.5	1162.8	1.3	20.0	128.1	0.7	1836.9

New = road was previously not restricted in winter; Modified, longer = restriction period is being extended; modified, shorter = restriction period id being shortened; Removed = road was previously restricted in winter, would be opened during that time

Table 3- 98 shows the miles of roads and motorized trails in RCAs and the associated stream crossings that would be open all year or closed all year.

Table 3- 98. Alternative 4 – Miles of NFTS Roads and Motorized Trails Open Year-round in RCAs, Miles of NFTS Roads and Motorized Trails Closed Year-round in RCAs and Numbers of Stream Crossing on Those Roads and Motorized Trails

Analysis Unit	NFTS Roads and Motorized Trails Open Year-round in RCA (mi)	Crossings Open Year-round (# in RCA / # outside RCA / total #)	NFTS Roads and Motorized Trails Closed Year-round in RCA (mi)	Crossings Closed Year-round (# in RCA / # outside RCA / total #)
SFM	21	165 / 273 / 438	8	60 / 18 / 78
WES	38	283 / 384 / 667	20	114 / 44 / 158
GLO	3	5 / 5 / 10	20	118 / 85 / 203
GAG	4	53 / 82 / 135	16	95 / 123 / 218
MAM	11	44 / 44 / 88	9	9 / 67 / 116
SSB	0	6 / 8 / 14*	14	92 / 35 / 127
EKP	0	0 / 0 / 0	1	0 / 0 / 0
JCH	12	59 / 45 / 104	10	35 / 10 / 45
TAD	1	8 / 2 / 10	32	192 / 32 / 224
DNK	30	194 / 181 / 375	37	304 / 47 / 351
TOTAL	120	817 / 1024 / 1841	167	1059 / 461 / 1520

* These stream crossings are on road 8S008, which forms the boundary between SSB and JCH. In the GIS analysis for this table, the miles of roads open year-round in RCA were tallied with JCH, but the stream crossing points were tallied with SSB. This is why the number of miles open in RCAs in SSB is zero, even though the presence of stream crossings indicates that there are some open roads.

Compared to the existing condition (also the effects of Alternative 1), this alternative would result in about 84 percent fewer miles of road and motorized trail being open year-round in RCAs, and about twice as many miles in RCAs being closed year-round (refer to Table 3- 82 for the existing condition). The number of stream crossings on roads and motorized trails open year-round would be about 75 percent less than in Alternative 1, while the number of crossings closed year-round would almost double compared to Alternative 1. The net result would be the greatest reduction in the overall potential for erosion and sediment delivery from the NFTS produced by any alternative. There would be a beneficial effect on water resources due to greater protection of roads when wet, since the miles of roads with winter restrictions and miles of roads prohibited year-round would both increase.

Cumulative Effects

For the analysis of cumulative effects, the direct and indirect effects of this alternative were considered in combination with the past, present, and reasonably foreseeable actions listed in Appendix E, including grazing, timber management (Sugar Pine, Fish Camp, Dinkey North, Dinkey South, KREW Providence and KREW Bull, plantation maintenance and roadside hazard reduction), management and maintenance of NFTS facilities, continuing permitted special uses, and public recreation. The ERA model also accounted for the disturbances of past, present, and reasonably foreseeable future actions in each subdrainage.

Routes and/or areas would be added to the system in 18 HUC8 subdrainages that were evaluated in the Detailed CWE Assessment. The HUC8s that were evaluated in the Detailed Assessment for Alternative 4 are shown in Figure 3- 16 and are listed in Table 3- 99 and Table 3- 100. Table 3-

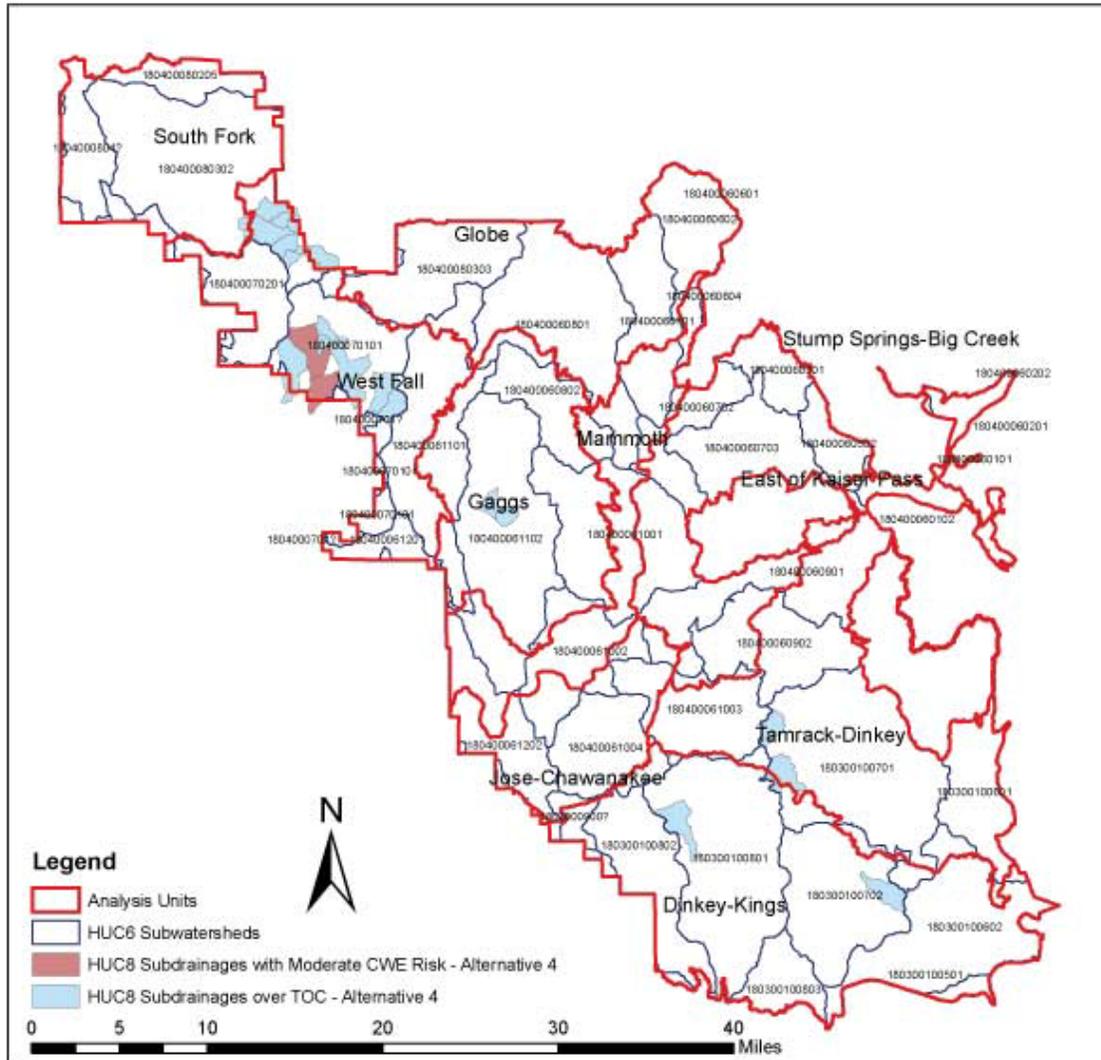
99 shows that the risk of CWEs in this alternative are the same as the risk under Alternative 3, and are reduced from the Alternative 1 risk in seven HUC8s. Because the risk of CWEs in Alternative 1 includes continued cross-country vehicle travel, while Alternative 3 does not allow cross-country travel and adds no facilities to the NFTS, these two alternatives define the greatest risk of CWEs (Alternative 1) and the lowest risk (Alternative 3). Comparing Alternative 4 to these alternatives shows where the effects of this alternative differ from these reference points. The risk is the same for Alternatives 3 and 4 in each of the subdrainages, which indicates that the routes and areas added in Alternative 4 do not substantially increase the risk of CWEs over the risk that exists when adding none. There are seven subdrainages where the risk of CWEs in this alternative are lower than for Alternative 1, and 11 where the risk is the same (Low).

Table 3- 99. HUC8 Subdrainages Evaluated in the Detailed Cumulative Watershed Effects Assessment that have additions to the NTFS in Alternative 4 – Risk of CWEs compared to Alternatives 1 and 3

Analysis Unit	HUC8 #	Risk of CWEs		
		Alt 1	Alt 3	Alt 4
WES	501.0023	Low	Low	Low
	501.4002	Low	Low	Low
	501.4003	Moderate	Low	Low
	501.5101	Low	Low	Low
	503.0003	Moderate	Low	Low
	503.0011	Low	Low	Low
	503.0052	High	Low	Low
	503.0053	High	Moderate	Moderate
	503.0054	High	Moderate	Moderate
	503.0055	Low	Low	Low
	503.0056	Low	Low	Low
	503.3051	Moderate	Low	Low
GAG	504.2102	Low	Low	Low
	504.2151	Low	Low	Low
TAD	520.0017	Low	Low	Low
	520.5001	Low	Low	Low
DNK	520.3002	Low	Low	Low
	519.3053	High	Low	Low

Figure 3- 16. HUC8 subdrainages that were evaluated in the Detailed CWE Assessment for Alternative 4

In this alternative, no subdrainages were determined to have a High risk of CWEs. The determination of risk for each subdrainage assumes that the specified design features have been implemented.



In this alternative, 16 of the HUC8s were determined to have a Low risk of CWEs and two have a Moderate risk. There are no HUC8s that were determined to have a High risk of CWEs. The routes that would be added to the NFTS in the Miami area are limited to those with little or no potential for contributing to CWEs. As use of other routes ceases to occur and these areas recover over time, the existing CWE impacts in this area (increased sediment filling pools and unstable stream channel conditions in Miami Creek) may be reduced. Unauthorized routes with severe gullies will not fully recover without active restoration, but the amount of sediment they deliver to the stream network will be reduced once the mechanical erosion from motor vehicle traffic ceases to occur.

Table 3- 100. HUC8 Subdrainages Evaluated in the Detailed Cumulative Watershed Effects Assessment that have Additions to the NTFS in Alternative 4

Analysis Unit	Subws #	Lower TOC (%)	Alt 4 (%) ERA	Risk of CWEs	Alt 4 stream crossings	Contributing Routes and /or Areas ¹	HUC6
WES	501.0023	4	11.6	Low	0	none	180400 080302 W SFk Merced
	501.4002	4	7.6	Low	15	TH-41y, TH-67y	
	501.4003	4	8.0	Low	0	TH-60z	
	501.5101	4	11.6	Low	2	none	
	503.0003	5	3.5	Low	1	PK11a	180400 070101 Miami
	503.0011	5	4.6	Low	0	none	
	503.0052	4	5.5	Low	4	none	
	503.0053	4	2.1	Moderate	2	none	
	503.0054	4	4.3	Moderate	1	none	
	503.0055	4	8.0	Low	4	SR-4z	
	503.0056	4	10.5	Low	9	TH-04, TH-12	
503.3051	4	13.5	Low	4	TH-01		
GAG	504.2102	4	5.1	Low	3	none	180400 061102 SFk Willow
	504.2151	4	6.7	Low	3	JSM56	
TAD	520.0017	4	6.8	Low	6	none	180300 100701 Upper Dinkey
	520.5001	5	5.1	Low	7	none	
DNK	520.3002	5	7.3	Low	0	KD-197	180300 100702 Lower Dinkey
	519.3053	5	9.1	Low	0	none	

¹Routes and areas located within these subdrainages that are either not eroding or do not have potential to deliver eroded material to the stream network are not listed here.

HUCs 503.0003 and 503.0011 are currently above their lower TOC of 5 percent and under this Alternative would see a reduction in ERAs to below the TOC. This alternative has overall the same risks of CWEs as Alternative 3, because additions to the NFTS were avoided in High risk subdrainages, and because the design features minimize adverse impacts of the added facilities.

Considering past, present, and reasonably foreseeable actions, this alternative would not result in an increased risk of CWEs, and no cumulative adverse impacts, compared to Alternative 1. The overall cumulative effect would be beneficial due to the direct and indirect benefits resulting from the prohibition of cross-country motor vehicle travel and from the changes to the NFTS. In each HUC8 evaluated in the Detailed Assessment, including the Miami Creek area, the beneficial effect is essentially the same as it is in Alternative 3 because none of the facilities proposed to be added to the NFTS in this alternative contribute to the risk of CWEs.

Compliance of Alternative 4 with the LRMP and Other Direction

This alternative complies with the LRMP (including the SNFPA) and other direction. The prohibition of cross-country motor vehicle use would reduce the amount of sediment generated on unauthorized routes, which would recover over the long term. Meadows, streams and other hydrologically sensitive areas would have a reduced risk for direct damage in the absence of cross-country motorized use. Only selected routes would be added to the system and these would be brought up to standards to minimize their effects to peak flows and sediment delivery through

implementation of BMPs and other specified measures and would be made consistent with RCOs. No routes in CARs or meadows would be added to the NFTS. The season of use of more roads would be consistent with BMPs and would provide protection against road surface deformation, flow concentration, erosion and sediment delivery – with the notable exception of 0.4 mile of 9S06, located in the RCA of the Jose Basin CAR, where winter season use is not consistent with BMPs or RCOs until this road segment is graveled (scheduled for 2010). Direction in the SNFPA to identify restoration opportunities (S&G #122) has been applied to the routes that were inventoried, but active restoration would not occur.

The analysis of this alternative was based on consideration of the best available science, including applicable peer-reviewed studies and local data.

The complete RCO Consistency Analysis is contained in Appendix J.

Alternative 5

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The effects of prohibiting cross-country motor vehicle travel would be the same as described under Alternative 2.

Additions to the NFTS

This alternative would add almost 22 miles of routes in RCAs, including 0.1 mi in the Jose Basin CAR. As shown in Table 3- 101, the added density in RCAs would be the highest in WES and GAG, which would also have the most stream crossings added. There would also be 6.7 ac of areas added in RCAs, including 0.4 ac in the Jose Basin CAR. There would be 157 miles of unauthorized routes in RCAs and 2133 stream crossings that would not be added to the NFTS in this alternative. The total number of miles of NFTS that would lie in RCAs as a result of this alternative would be increased by about 2 percent (1008 plus 21.7 miles), as would the total stream crossings on NFTS roads and trails. Open Areas, parking, and staging areas in RCAs would increase by about 25 percent.

Table 3- 101. Number and Density of Routes in RCAs and Stream Crossings and Acres of Added Areas in RCAs

These metrics are based on GIS analysis. Stream crossings include perennial, intermittent and ephemeral streams, some of which are actually unscoured swales.

Analysis Unit	Routes Added in RCA (mi)	Added route density in RCA (mi / mi ²)	Added crossings (#)	Added crossing density (# / mi ²)	Added Areas in RCA (ac)
SFM	1.7	0.05	25	0.2	0
WES	8.3	0.19	161	1.2	0
GLO	1.5	0.03	18	0.1	0
GAG	3.9	0.10	71	0.5	0
MAM	0.2	0.01	6	0.1	0
SSB	0.1	0	3	0	0
EKP	0.1	0	1	0	2.0
JCH	0.7	0.02	2	0	0.4
TAD	4.2	0.06	66	0.4	3.2
DNK	1.0	0.01	8	0.03	1.1
TOTAL / AVERAGE	21.7	0.05	361	0.3	6.7

As shown in Table 3- 102, 18 percent of the added roads, 30 percent of the added trails and 2 percent of the added areas are currently eroding. Most of the erosion will be remedied with the construction of appropriate surface drainage structures (see prescriptive actions for issue codes SW-2, SW-3, SW-4 in Appendix A). Other common needs include the repair of surface erosion (SW-14) and improvement of stream crossings (SW-8 and SW-9). The prescriptive actions are expected to minimize the concentration of runoff, erosion, sediment delivery and impacts to riparian areas and stream channels.

Table 3- 102. Miles of Routes and Acres of Areas with Known Erosion Features Added to the NFTS in Alternative 5

Analysis Unit	Added Roads total mi / eroding mi / percent eroding	Added Trails total mi / eroding mi / percent eroding	Added Areas total ac / eroding ac / percent eroding
SFM	1.6 / 0.1 / 6%	2.2 / 0.3 / 12%	0 / 0 / 0%
WES	3.1 / 0.7 / 22%	29.2 / 11.9 / 41%	26.4 / 0.2 / 1%
GLO	0 / 0 / 0%	4.8 / 1.3 / 28%	0 / 0 / 0%
GAG	3.5 / 0.6 / 17%	17.0 / 3.4 / 20%	71.9 / 0 / 0%
MAM	0.1 / 0 / 0%	1.3 / 0.4 / 28%	0 / 0 / 0%
SSB	0.8 / 0 / 0%	0 / 0 / 0%	0 / 0 / 0%
EKP	0.8 / 0 / 0%	0 / 0 / 0%	2.3 / 0.2 / 9%
JCH	0.9 / 0.2 / 18%	1.6 / 1.6 / 95%	0.7 / 0.03 / 5%
TAD	2.4 / 0.7 / 29%	15.6 / 2.8 / 18%	9.6 / 0 / 0%
DNK	1.1 / 0.4 / 37%	2.8 / 0.5 / 18%	5.8 / 2.3 / 40%
TOTAL/AVERAGE%	14.3 / 2.6 / 18%	74.6 / 22.1 / 30%	116.6 / 2.8 / 2%

Table 3- 103 shows that there are 12 locations on trails and 2 on roads added in this alternative where stream channel diversions are occurring, as well as 4 locations on added roads and 4 on added trails with the potential to divert streams in the near future. The prescriptive actions specified in Appendix A will address these locations, so that when they are added to the system there will be no diversions occurring and the potential for new ones will be minimized.

Table 3- 103. Number of Documented Stream Channel Diversions and Potential Diversion Locations Added to the NFTS in Alternative 5

Analysis Unit	Added Roads diversions / potential	Added Trails diversions / potential
SFM	0 / 0	0 / 1
WES	0 / 0	3 / 2
GLO	0 / 0	0 / 0
GAG	0 / 0	6 / 1
MAM	0 / 0	1 / 0
SSB	0 / 0	0 / 0
EKP	0 / 0	0 / 0
JCH	0 / 0	0 / 0
TAD	1 / 2	2 / 0
DNK	1 / 2	0 / 0
TOTAL	2 / 4	12 / 4

Changes to the NFTS (changing vehicle class, season of use and opening or closing roads)

Changing vehicle class between highway-legal vehicles, all vehicles and vehicles less than 50” are assumed to have no effect on the impacts of the NFTS and are therefore not considered in the water resources analysis (see Assumptions in section 3.10.1).

Seasonal closures during the winter period would be increased on 1632 mi, decreased on 168 mi and not changed on 1124 mi of NFTS roads. The types of changes are characterized in Table 3-104 to show the number of days the closure periods would change. Except for the Bald Mountain OHV Route (a NFTS motorized trail in TAD), the roads characterized as having a ‘winter closure’ are restricted from 15-December (or earlier) through April 1 (or later). Roads that are closed year-round are included in these figures; for example, a road that was previously prohibited year-round that is now open for part of the year would show up in the ‘Modified >30 days shorter’ category.

Table 3- 104. Miles of Changes to Winter Season Road Restrictions in Alternative 5 (Includes Roads Closed Year-round)

Analysis Unit	Change in Winter Closure Period								Total Changes (mi)
	New (mi)	Modified >= 15 days longer (mi)	Modified 16 - 30 days longer (mi)	Modified >30 days longer (mi)	Modified <= 15 days shorter (mi)	Modified 16 - 30 days shorter (mi)	Modified >30 days shorter (mi)	Removed (mi)	
SFM	21.5	4.0	0	2.0	0	0	1.5	0	29.0
WES	36.7	9.2	0	99.6	0	0	3.9	0	149.3
GLO	16.1	0	0	295.8	0	0	5.5	0	317.4
GAG	12.1	18.6	0	164.0	0	0	6.6	0.3	201.6
MAM	9.2	0	0	64.4	0	0	6.2	0	79.8
SSB	19.8	37.5	4.2	135.7	0	9.1	44.1	0	250.4
EKP	2.7	0	0	54.0	0	0	0.2	0	56.9
JCH	13.0	12.1	0	36.0	0	0	8.4	0.4	69.9
TAD	50.5	23.6	2.8	193.5	0	7.7	21.4	0	299.5
DNK	75.3	26.5	26.5	164.9	1.3	3.2	48.7	0	346.4
TOTAL	256.9	131.4	33.5	1209.9	1.3	20.0	146.4	0.7	1800.0

New = road was previously not restricted in winter; Modified, longer = restriction period is being extended; modified, shorter = restriction period is being shortened; Removed = road was previously restricted in winter, would be opened during that time.

Overall, these changes would provide the necessary protection from the impacts of wet weather use on all of the miles shown, except for the 0.7 miles with the closures removed. These are the same road segments described in Alternative 4. Of the 0.7 miles with the winter closure removed, 0.3 mi is an aggregate surface road that lies within RCA and accesses private property. While there is a risk of some sediment generation due to wet season traffic in the RCA, the aggregate surfacing minimizes this risk and meets BMPs. The remaining 0.4 mi is a segment of road 9S06, which is a native surface road located in the RCA of the Jose Basin CAR. Opening this road segment to wet season traffic will increase the risk of road erosion and sediment introduction into the adjacent stream, which is tributary to Jose Creek. In the short term, this action is not compliant with BMPs or consistent with RCOs. However, the segment is scheduled to be surfaced (i.e., graveled) in 2010, and surfacing will bring it into compliance by minimizing erosion and sedimentation associated with wet weather use.

The increased closures also include a spring snowmelt closure that would be added to the Bald Mountain OHV Route, which would be restricted from 1-April to 20-May. This would protect the route from damage that occurs when tires break through melting snow and rut the saturated road surface, while still providing for over-snow recreation until 1-April. This is expected to reduce the amount of sediment movement along the route and into stream channels, including ephemeral channels and also to minimize stream bank deformation and the risk of stream capture at the diversion / gully location near PK-01zd. (Although much of the Bald Mountain Route lies on granite, it is not possible to protect the portions on soils while still allowing use of the granite areas.)

Table 3- 105. Alternative 5 – Miles of NFTS Roads and Motorized Trails Open Year-round in RCAs, Miles of Roads and Motorized Trails Closed Year-round in RCAs and Numbers of Stream Crossing on those Roads and Trails

Analysis Unit	NFTS Roads and Motorized Trails Open Year-round in RCA (mi)	Crossings Open Year-round (# in RCA / # outside RCA / total #)	NFTS Roads and Motorized Trails Closed Year-round in RCA (mi)	Crossings Closed Year-round (# in RCA / # outside RCA / total #)
SFM	21	165 / 273 / 438	7	55 / 9 / 64
WES	43	316 / 413 / 729	15	77 / 12 / 89
GLO	23	116 / 55 / 171	8	49 / 10 / 59
GAG	5	102 / 139 / 241	6	37 / 8 / 45
MAM	17	56 / 78 / 134	4	22 / 10 / 32
SSB	0.3	6 / 8 / 14	14	92 / 33 / 125
EKP	0	0 / 0 / 0	1	0 / 0 / 0
JCH	13	64 / 49 / 113	9	35 / 12 / 47
TAD	2	8 / 2 / 10	30	183 / 19 / 202
DNK	30	194 / 181 / 375	36	299 / 33 / 332
TOTAL	155	1027 / 1198 / 2225	131	846 / 146 / 995

Table 3- 105 shows that the roads open year-round in RCAs would be reduced by about 80 percent from the existing condition (see Table 3- 82). This is a slightly smaller reduction than would result from Alternative 4 (see Table 3- 98). There would be 60 percent more miles of roads in RCAs closed year-round in Alternative 5 compared to the existing condition. The number of stream crossings open to traffic year-round would be reduced by 74 percent compared to the existing condition, while the number closed year-round would increase by 25 percent, from 793 to 995. The net effect would be a greatly reduced potential for erosion and sediment delivery

from the NFTS. The reduction is slightly smaller than the reduction achieved by Alternative 4, but greater than the reduction under Alternative 2.

Cumulative Effects

For the analysis of cumulative effects, the direct and indirect effects of this alternative were considered in combination with the past, present, and reasonably foreseeable actions listed in Appendix E, including grazing, timber management (Sugar Pine, Fish Camp, Dinkey North, Dinkey South, KREW Providence and KREW Bull, plantation maintenance and roadside hazard reduction), management and maintenance of NFTS facilities, continuing permitted special uses, and public recreation. The ERA model also accounted for the disturbances of past, present, and reasonably foreseeable future actions in each subdrainage.

Routes and/or areas would be added to the system in 22 HUC8 subdrainages that were evaluated in the Detailed CWE Assessment. Table 3- 106 displays the risk of CWEs for each subdrainage in this alternative compared to the risk in Alternative 1 and Alternative 3. Because the risk of CWEs in Alternative 1 includes continued cross-country vehicle travel, while Alternative 3 does not allow cross-country travel and adds no facilities to the NFTS, these two alternatives define the greatest risk of CWEs (Alternative 1) and the lowest risk (Alternative 3). Comparing Alternative 5 to these alternatives shows where the effects of this alternative differ from these reference points. The risk is the same for all three of these alternatives in 12 of the subdrainages, which indicates that the routes and areas present in these HUC8s do not substantially affect the risk of CWEs. There are four subdrainages where the risk of CWEs in this alternative are the same as for Alternative 1, and one (503.0052) where the risk is lower than the risk for Alternative 1 but higher than for Alternative 3. Overall for this alternative, 17 HUC8s were determined to have a low risk of CWEs, three have a moderate risk, and two have a high risk. The determination of risk for each subdrainage assumes that the specified prescriptive actions in Appendix A have been implemented.

Table 3- 106. HUC8 Subdrainages Evaluated in the Detailed Cumulative Watershed Effects Assessment that have Additions to the NTFS in Alternative 5 – Risk of CWEs Compared to Alternative 1 and Alternative 3

Analysis Unit	HUC8	Risk of CWE		
		Alt 1	Alt 3	Alt 5
WES	501.0023	Low	Low	Low
	501.4002	Low	Low	Low
	501.4003	Moderate	Low	Moderate
	501.5101	Low	Low	Low
	503.0002	Moderate	Low	Low
	503.0003	Moderate	Low	Moderate
	503.0011	Low	Low	Low
	503.0052	High	Low	Moderate
	503.0053	High	Moderate	High
	503.0054	High	Moderate	High
	503.0055	Low	Low	Low
	503.0056	Low	Low	Low
	503.3051	Moderate	Low	Low
GAG	504.2008	Low	Low	Low
	504.2102	Low	Low	Low
	504.2151	Low	Low	Low
TAD	520.0017	Low	Low	Low
	520.0056	Low/Mod	Low	Low
	520.5001	Low	Low	Low
DNK	520.3002	Low	Low	Low
	519.3053	High	Low	Low
	519.4051	Low	Low	Low

Figure 3- 17 displays the HUC8s that were included in the Detailed CWE Assessment for Alternative 5, and Table 3- 107 shows a summary of the assessment.

Figure 3- 17. HUC8 Subdrainages that were Evaluated in the Detailed CWE Assessment for Alternative 5

Those with a high risk of CWEs are shaded darker.

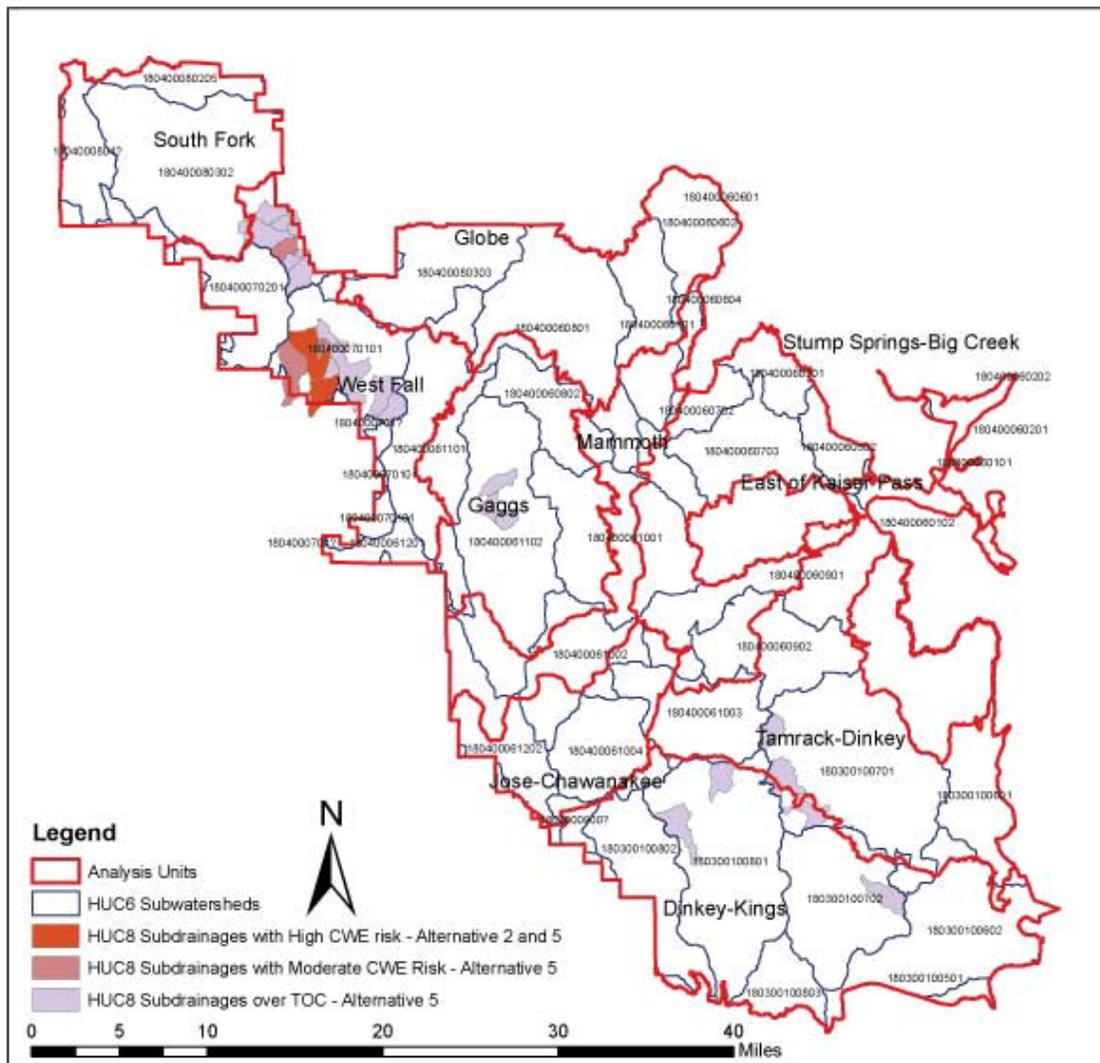


Table 3- 107. Subdrainages with Additions to the NTFS in Alternative 5 that are Over the Lower TOC

Analysis Unit	Subws #	Lower TOC (%)	Alt 5 percent ERA	Risk of CWEs	Alt5 stream crossings	Contributing Routes and /or Areas ¹	HUC6
WES	501.0023	4	11.6	Low	0	none	18040008 0302 W SFk Merced
	501.4002	4	6.7	Low	20	TH-41y, TH-67y, TH-68z	
	501.4003	4	8.2	Moderate	6	TH-60z, TH-67z, TH-68z	
	501.5101	4	11.6	Low	2	none	
	503.0002	4	3.1	Low	0	none	18040007 0101 Miami
	503.0003	5	4.5	Moderate	16	PK11a, PK24	
	503.0011	5	4.7	Low	0	none	
	503.0052	4	5.8	Moderate	13	none	
	503.0053	4	2.7	High	21	SR-21z, SV16	
	503.0054	4	4.6	High	8	SR-92	
	503.0055	4	8.1	Low	28	JM-2y, JM-21y, SR-4z, SV31	
	503.0056	4	10.6	Low	14	TH-04, TH-12	
	503.3051	4	13.6	Low	12	TH-01, TH-02	
GAG	504.2008	4	5.2	Low	0	RCKCRKSP R391	18040006 1102 SFk Willow
	504.2102	4	5.1	Low	3	none	
	504.2151	4	6.7	Low	3	JSM56	
TAD	520.0017	4	6.8	Low	6	none	18030010 0701 Upper Dinkey
	520.0056	5	13.9	Low	0	none	
	520.5001	5	5.2	Low	4	none	
DNK	519.3053	5	9.1	Low	0	none	18030010 0702 Lower Dinkey
	520.3002	5	7.3	Low	0	none	
	519.4051	4	9.8	Low	0	AE-23, BLUCYN4, BLUCYN6	18030010 0801 Kings Big Cr

¹Routes and areas located within these subdrainages that are either not eroding or do not have potential to deliver eroded material to the stream network are not listed here.

This alternative would add the most routes in HUC8s that were evaluated in the Detailed CWE Assessment and has more routes needing work to limit the potential for CWEs than any other alternative. In the Miami HUC6, where CWEs are currently occurring and which continues to be at high risk in this alternative, there would be a total of 112 stream crossings on added routes. Fourteen (14) routes would be added that have been identified as potentially contributing to CWEs. The work specified in Appendix A will minimize their contribution and these routes will be maintained as necessary to limit their contribution in the future.

Considering past, present, and reasonably foreseeable actions, this alternative would not result in an increased risk of CWEs, compared to Alternative 1. The overall cumulative effect would be beneficial due to the direct and indirect benefits resulting from the prohibition of cross-country

motor vehicle travel and the changes to the NFTS. In four of the five subdrainages at Moderate or High risk, including three in the Miami Creek area, the risk of CWEs would not be substantially reduced compared to Alternative 1, due to the location and condition of some of the trails proposed to be added to the NFTS in this Alternative.

Compliance of Alternative 5 with the LRMP and Other Direction

This alternative complies with the LRMP (including the SNFPA) and other direction. The prohibition of cross-country motor vehicle use would reduce the amount of sediment generated on unauthorized routes, most of which would recover over the long term. Meadows, streams and other hydrologically sensitive areas would have a reduced risk for direct damage in the absence of cross-country motorized use. Only selected routes would be added to the system and these would be brought up to standards to minimize their effects to peak flows and sediment delivery, including the implementation of BMPs and would be made consistent with RCOs. There would be one route and one area (SR-36 and area SGRLFHL223) added to the NFTS in the Jose Basin CAR; however, field evaluation determined that these features do not have effects on the aquatic or riparian areas in the CAR and these additions to the NFTS are therefore consistent with RCOs for the CAR. No routes would be added in meadows. The season of use of more roads would be consistent with BMPs and would provide protection against road surface deformation, flow concentration, erosion and sediment delivery. There is 0.4 mile of 9S06, located in the RCA of the Jose Basin CAR, where winter season use will not be consistent with BMPs or RCOs until this road segment is graveled, which is scheduled to occur in 2010. Direction in the SNFPA to identify restoration opportunities (S&G #122) has been applied to the routes that were inventoried, but active restoration would not occur as a result of this alternative.

The analysis of this alternative was based on consideration of the best available science, including applicable peer-reviewed studies and local data.

The complete RCO Consistency Analysis is contained in Appendix J.

Compliance with the Travel Management Rule

With the implementation of the prescriptive actions specified in Appendix A, Alternatives 2-5 would be in compliance with the Travel Management Rule for minimizing effects to watershed resources.

Summary of the Forestwide Effects Analysis across All Alternatives

The following tables contain summaries of the Forestwide discussion of the environmental consequences of the alternatives. Table 3- 108 displays a summary of the indicators used in the discussion. Table 3- 109 shows the conclusions from the Detailed CWE Assessment. Table 3- 110 displays the indicators that were used in the Detailed CWE Assessment.

Table 3- 108. Summary of Forestwide Environmental Consequences

Indicator	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Unauthorized miles open in RCA	156	0	0	0	0
Unauthorized miles open in CAR	33.7	0	0	0	0
Miles added in RCA	0	9.7	0	11.2	21.7
Miles added in CAR	0	0	0	0	0.1
Acres of areas added in RCA	0	3.1	0	3.3	6.7
Acres of areas added in CAR	0	0	0	0	0.4
Number of stream crossings on unauthorized routes added to NFTS or open to use	2251	235	0	188	361
Miles of eroding routes added	0	15.5	0	10.7	24.7
Number of diversions/potential diversions added	0	2 / 4	0	5 / 4	14 / 8
Miles with new winter closure added	0	180	0	379	257
Miles with winter closure removed	0	5	0	1	1

Table 3- 109. Summary of the Detailed Assessment Conclusions Regarding the Risk of Cumulative Watershed Effects by Alternative

Indicator		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Baseline CWE Analysis: Number of HUC8s (with motor vehicle use on open or added routes) that are over the lower TOC		96	13	0	18	22
Detailed CWE Assessment: Number of HUC8s (with motor vehicle use on open or added routes) with CWE potential:	Low	15	9	21	16	17
	Moderate	5	2	3	2	3
	High	5	2	1	0	2

Table 3- 110. Summary of Detailed CWE Assessment – Risk of CWEs for each Alternative

HUC8 ID	Lower TOC	Alternative 1			Alternative 2			Alternative 3		Alternative 4			Alternative 5		
		Total ERA percent	Stream Crossing	Risk of CWE	Total ERA percent	Stream Crossing	Risk of CWE	Total ERA percent	Risk of CWE	Total ERA percent	Stream Crossing	Risk of CWE	Total ERA percent	Stream Crossing	Risk of CWE
501.0023	4%	11.68	0	Low	-	-	-	11.54	Low	11.59	0	Low	11.59	0	Low
501.4002	4%	7.74	32	Low	7.53	20	Low	7.48	Low	7.59	15	Low	6.71	20	Low
501.4003	4%	8.44	7	Moderate	7.96	4	Low	7.93	Low	7.96	0	Low	8.16	6	Moderate
501.5101	4%	11.61	5	Low	11.56	2	Low	11.55	Low	11.59	2	Low	11.59	2	Low
503.0002	4%	4.18	5	Moderate	3.05	0	Low	3.02	Low	-	-	-	3.06	0	Low
503.0003	5%	5.53	26	Moderate	3.55	13	Moderate	3.16	Low	3.49	1	Low	4.46	16	Moderate
503.0006	4%	11.87	0	Low	-	-	-	11.85	Low	-	-	-	-	-	-
503.0011	5%	5.13	8	Low	-	-	-	4.48	Low	4.64	0	Low	4.69	0	Low
503.0052	4%	6.43	52	High	5.56	9	Moderate	5.5	Low	5.54	4	Low	5.77	13	Moderate
503.0053	4%	3.08	68	High	2.21	40	High	1.99	Moderate	2.09	2	Moderate	2.7	21	High
503.0054	4%	5.42	55	High	4.37	16	High	4.23	Moderate	4.32	1	Moderate	4.55	8	High
503.0055	4%	8.59	60	Low	7.95	23	Low	7.90	Low	7.97	4	Low	8.09	28	Low
503.0056	4%	10.77	20	Low	-	-	-	10.33	Low	10.51	9	Low	10.62	14	Low
503.3051	4%	13.98	28	Moderate	-	-	-	13.46	Low	13.5	4	Low	13.62	12	Low
504.2008	4%	5.34	3	Low	-	-	-	1.49	Low	-	-	-	5.16	0	Low
504.2102	4%	5.2	5	Low	-	-	-	5.05	Low	5.14	3	Low	5.14	3	Low
504.2151	4%	7.1	12	Low	-	-	-	6.18	Low	6.68	3	Low	6.68	3	Low
504.2251	5%	23.5	35	High	-	-	-	22.25	High	-	-	-	-	-	-
519.3053	5%	9.27	2	High	-	-	-	9.07	Low	9.07	0	Low	9.07	0	Low
519.4051	4%	9.8	2	Low	-	-	-	9.72	Low	-	-	-	9.76	0	Low
520.0017	4%	7.12	30	Low	6.71	2	Low	6.7	Low	6.76	6	Low	6.76	6	Low
520.0056	5%	14.14	4	Low/Mod	13.89	0	Low	13.89	Low	-	-	-	13.89	0	Low
520.3002	5%	7.4	1	Low	7.26	1	Low	7.25	Low	7.29	0	Low	7.29	0	Low
520.3003	4%	4.55	3	Moderate	-	-	-	4.42	Moderate	-	-	-	-	-	-
520.5001	5%	5.76	32	Low	5.03	10	Low	4.94	Low	5.13	7	Low	5.19	4	Low

Missing values (“-“) indicates that the subdrainage was not involved in the alternative

3.11 Botanical Resources

3.11.1 Introduction

This section describes the affected environment and environmental consequences for threatened, endangered and sensitive plant species as well as certain Watch List species, collectively referred to in this document as rare plants. It describes the area potentially affected by the alternatives and existing resource conditions within that area. Measurement indicators are used to describe the existing conditions for the SNF. The measurement indicators will be used in the analysis to quantify and describe how well the proposed action and alternatives meet the project objectives and address resource concerns.

Of the Forest Service Regions, the Pacific Southwest Region contains the largest assemblage of sensitive plant species in comparison to its land base. Of the more than 6,000 vascular plant species occurring in California, well over half are known to occur on National Forest System (NFS) lands. This is due to topography, geography, geology and soils, climate and vegetation, the same factors that account for the exceptionally high endemic flora of the State. Over 100 plant species are found only on NFS lands in California and nowhere else in the world (Powell 2001).

Management of plant and fungi species, habitat and maintenance of a diversity of plant communities, is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on NFS lands must be planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species or lead to a trend toward listing or loss of viability of Forest Service Sensitive species. In addition, management activities should be designed to maintain or improve habitat for rare plants and natural communities to the degree consistent with multiple-use objectives established in each National Forest LRMP. Key parts include: developing and implementing management practices to ensure that species do not become threatened or endangered because of FS actions; maintaining viable populations of all native and desired non-native wildlife, fish and plant species in habitats distributed throughout their geographic range on NFS lands and developing and implementing management objectives for populations and/or habitats of rare species. The Pacific Southwest Region has over 425 rare plant species on NFS lands.

Management decisions related to motor vehicle use can affect plant and fungi species, their habitats and natural communities. Potential effects include, but are not limited to: death or injury to plants; habitat modification; habitat fragmentation, and degradation of habitat quality. Examples of effects on habitat are: increased rates of weed introduction and spread, changes in hydrology, increased erosion, soil compaction, increased sedimentation of streams and meadows, killing or reducing populations of pollinators, loss of surrounding vegetation or other factors reducing or eliminating plant growth and reproduction (see Trombulak and Frissell 2000). The FS provides a process and standard through which rare plants receive full consideration throughout the planning process, reducing negative impacts on species and enhancing opportunities for mitigation by developing and implementing management objectives for populations and/or habitats of sensitive species. It is Forest Service policy to minimize damage to soils and vegetation, avoid harassment to wildlife and avoid significant disruption of wildlife habitat while providing for motor vehicle use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to motor vehicle use on NFS lands must consider effects to plant species, fungi species and their habitats.

Analysis Framework: Statute, Regulation, LRMP and Other Direction

Direction relevant to the analysis of the alternatives as it affects botanical resources includes:

Endangered Species Act (ESA). The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a Federal agency is not likely to jeopardize the continued existence of a threatened or endangered (TE) species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible Federal agency to consult the USFWS and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE species to ensure management activities are not likely to jeopardize the continued existence of a TE species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. This assessment is documented in a Biological Assessment (BA) and is summarized or referenced in this Chapter. Federally-listed species that were considered in the analysis for this project include:

- Mariposa pussypaws (*Calyptidium pulchellum*), Federally Threatened (FT). Date Listed- Sep. 14, 1998. Five Year Review for Mariposa pussypaws- Jan. 10, 1998. (http://ecos.fws.gov/docs/five_year_review/doc1871.pdf)
- Keck's checkermallow (*Sidalcea keckii*), Federally Endangered (FE). Date listed- Feb. 16, 2000. Final Rule for Designation of Critical Habitat for Keck's checkermallow- Mar. 18, 2003 (68 FR 12863-12880). Five Year Review for Keck's checkermallow- Jan. 10, 2008 (http://ecos.fws.gov/docs/five_year_review/doc1870.pdf).

E.O. 13112 Invasive Species 64 FR 6183 (February 8, 1999). To prevent and control the introduction and spread of invasive species.

Forest Service Manual and Handbooks (FSM2670, FSH 2609.25). Forest Service Sensitive (FSS) species are plant species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on National Forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in a Biological Evaluation (BE) and is summarized or referenced in this Chapter.

Sierra Nevada Forest Plan Amendment (SNFPA) (USDA-FS 2001, 2004a). Forestwide standard and guidelines (S&G) that were not superseded by the 2001 or 2004 amendments applicable to the Travel Management project for botanical resources include:

- Noxious weeds management (Management S&Gs 36-49).
- Wetland and Meadow Habitat (Management S&G 70): See Water Resources section.
- Riparian Habitat (Management S&G 92): See Water Resources section.
- Bog and Fen Habitat (SNFPA ROD page 65, S&G #118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans and wheeled vehicles.

- Sensitive Plant Surveys (Corrected Errata, April 19, 2005) - Conduct field surveys for threatened, endangered, proposed and sensitive TEPS plant species early enough in project planning process that the project can be designed to conserve or enhance TEPS plants and their habitat. Conduct surveys according to procedures outline in the Forest Service Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, survey results must be documented in the project file. (Management S&G 125). The standards and guidelines provide direction for conducting field surveys, minimizing or eliminating direct and indirect impacts from management activities and adherence to the Regional Native Plant Policy (USDA-FS 2004b).

SNF Land and Resource Management Plan (LRMP) (1991). LRMP direction for Sensitive plant species is to develop and implement management practices to ensure that Sensitive species do not become threatened or endangered because of Forest Service actions. The LRMP contains the following direction relevant for motorized travel management and botanical resources:

- Manage sensitive plant species to avoid future listing as threatened and endangered.
- Standard and Guideline 68 directs the SNF to ensure maintenance of genetic and geographic diversity and viable populations of sensitive plants.
- The LRMP also states that the SNF will conduct sensitive plant surveys and field investigations prior to any ground-disturbing activity in areas that sensitive plants are known or suspected to occur. Avoidance or mitigation measures are to be included in project plans and Environmental Assessments (USDA-FS 1991).

SNF TES Plant Guides, Conservation Assessments: The following references were used in establishing effects analysis for certain TES plant species on the SNF:

- Merced clarkia (*Clarkia lingulata*) Conservation Agreement (USDA-FS 1999).
- Mountain lady's slipper (*Cypripedium montanum*) and clustered lady's slipper (*C. fasciculatum*) orchid Conservation Assessment (Kaye and Cramer 2005).
- Three-ranked hump moss (*Meesia triquetra*) and broad-nerved hump moss (*M. uliginosa*) Conservation Assessment (Dillingham 2005).

Effects Analysis Methodology

The analysis of effects on rare plant species was a three-step process (FSM 2672.43). First, all rare species that are known or are believed to have potential to occur in the analysis area were identified. Existing Forest records, Global Information System (GIS) and tabular data from the California Natural Diversity Database (CNDDDB) (CDFG 2009), the Inventory of Rare and Endangered Plants of California (CNPS 2009) and the Jepson Manual (Hickman 1993) were reviewed to determine known locations, range and habitat requirements for each species. Aerial photography was also utilized to identify potential fens and rare plant habitat. A list of species to include in the analysis was then compiled using the U.S. Fish and Wildlife List for the SNF Forest (USDI-USFWS 2007), the USDA Forest Service Pacific Southwest Region Sensitive Species List (USDA-FS 2006a) and the SNF Watch List (USDA-FS 2006b). Species considered in this analysis are listed in the Affected Environment section below.

Second, field surveys were conducted, focused primarily on unauthorized routes within or adjacent to areas with potential habitat for sensitive plant species. Botanical field surveys were conducted over at least 300 miles of unauthorized routes. Field surveys were conducted at the time of year when plants and/or habitat were evident and identifiable. Additionally, information

on rare plants from past field surveys, monitoring and personal field observations made by Forest Service or other professional botanists were utilized during the analysis (SNF files 1990 to 2009). Every proposed route and Open Area in Alternatives 2, 4 and 5 was surveyed by a SNF botanist from 2007 through 2009; however in some cases only an assessment of suitable habitat was possible, especially for large proposed areas with habitat for early-blooming sensitive plants such as the Mono Hot Springs evening primrose, Yosemite bitterroot, or Kellogg's lewisia. Mapping methodology varied, but included use of a Global Positioning System (GPS), topographic maps and/or aerial photos.

All of this information was used in step three of the analysis, where data were imported into a GIS and used to analyze potential habitat and proximity of known occurrences to unauthorized routes, as well as to identify effects and develop mitigation measures. Each road, trail and area proposed in the alternatives has been reviewed by resources specialists and their findings are documented in the project record and as a summary in Appendix A, Route Specific Data. Readers seeking more detailed information concerning the environmental effects associated with a specific road, trail or area are directed to Appendix A and the project record, where details of field observations are documented.

For projects covering as much area as the Travel Management proposal, evaluation of potential effects is often more meaningful if specific types of habitat for groups of rare plant species are contrasted. The idea is to evaluate relative risk or benefits of the alternatives on habitat types inhabited by rare plants, especially to conceptualize how Alternative 1, which allows cross-country travel, compares with Alternatives 2-5, which prohibit cross-country travel. For the purposes of this analysis, four basic habitat types or "guilds" are used to evaluate broad scale differences among the alternatives. The guilds are: Riparian, Forested, Rock Outcrop and Chaparral. Some TES species do not fall into the listed habitat categories, in which case effects of the alternatives are discussed separately. The guilds are described in the Affected Environment section.

Assumptions Specific to Botanical Resources Analysis

1. Motor vehicle use on and near unauthorized routes has affected or has the potential to affect rare plant populations, either directly by damage or death to individual plants (stem breaking, crushing, etc.) or indirectly by altering the habitat through soil disturbance, changes in hydrologic functioning or by the introduction of non-native, invasive plant species that can out-compete sensitive species for water, sunlight and nutrients. Examples of scientific literature documenting the validity of this assumption are: Groom et al (2007); Ouren et al (2007); Trombulak and Frissell (2000); and Kutiel et al (1999).
2. Motor vehicle use is unlikely to impact certain rare plant habitats due to the steep or rocky nature of the surrounding terrain; motor vehicle use is more likely to impact other rare plant habitats, such as meadows and granite domes, which exist on gentle slopes or flat terrain with little or no vegetation or natural barriers to motor vehicles.
3. Without specific prevention and/or control measures, invasive non-native plants (weeds) will continue to spread along and within surfaced and unsurfaced motor vehicle roads/motorized trails/areas. Examples of scientific literature documenting or reviewing the validity of this assumption are: Sheley et al (1999) review the factors involved in preventing noxious weed expansion, and cite an experiment demonstrating that vehicles spread spotted knapweed in Montana. Rooney (2005) studied weed dispersal in relation to ORVs in Wisconsin, and concluded that ORVs were likely agents for weed seed movement at least in some cases.

4. Motor vehicle use on unsurfaced roads/motorized trails/areas will increase sediment production and erosion. As use increases, sediment production and erosion will increase.
5. Changes in vehicle class will not result in differing effects to TES plants.
6. Open Areas include cross-country areas that are open to all vehicles, parking areas that are open to 'highway-legal vehicles only', and staging areas that are open to 'highway-legal vehicles only'. Of the three types of those open to all vehicles tend to have the highest level of impact to rare plants. To be conservative, all three types will be analyzed as if they were open to all vehicles and analyzed for the highest level of impact. As such, the three different types of areas will not be analyzed separately. Throughout the remainder of this report, they will be cumulatively referred to as Open Areas or areas

Data Sources

As described above, there were a number of ways that data for this project was obtained but the primary source was through botanical field surveys conducted from 2007 through 2009. All proposed motorized trails and roads were walked on the ground and areas within 100 feet of either side of the road were examined. Sensitive habitat areas such as fens or wet meadows near proposed roads or routes were also examined within 200 feet of proposed motorized trails. All proposed areas were surveyed with rare plant habitat being the primary focus (e.g. rock outcrops, gravel flats, meadows). Historical rare plant and noxious weed data was used to inform survey work and known populations of rare plants (and noxious weeds) were visited to assess their current status. This information is incorporated into the SNF GIS database and on field survey forms supplied to the California Department of Fish and Game's Natural Diversity Database (rare plants) or the SNF noxious weed database, as described above.

Indicators were derived for the analysis in order to have a semi-quantitative gauge for comparing alternatives in terms of resource impacts. The following indicators were used by the SNF to compare the relative effect of the alternatives on rare plants:

Botanical Resources Measurement Indicators

- Number of rare plant species and populations within the analysis units as a way to compare Alternative 1 with the action alternatives.
- Number of rare plant populations within or adjacent to proposed roads, motorized trails and areas, as a proxy for likelihood of direct and indirect effects.
- Season of Use /Prohibition of NFTS Use: Number of rare plant populations or sensitive habitat areas affected by changes in seasonal road closures.
- Miles of proposed facilities open for motor vehicle use within riparian habitat, including meadows, fens and streambanks.

As previously described (Chapter 2), there are four actions proposed: the prohibition of cross-country travel, adding facilities to the NFTS, changes to the NFTS, and two non-significant LRMP amendments. Effects to botanical resources were considered both spatially and temporally, along with the indicators deemed to be appropriate for comparing alternatives. With the exception of the prohibition of cross-country travel, botanical surveys were the primary method of obtaining information about proposed motorized trails, roads and open areas. A summary of the methodology by these four actions are described below as well as a description of how cumulative effects were assessed:

Botanical Resources Methodology by Action

The analysis methodologies for each of the four actions that make up the alternatives and cumulative effects of the actions are described below.

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

Short-term timeframe: 1 year. Short-term effects include immediate effects from changes in travel management that will be evident within the first year of implementation.

Long-term timeframe: 20 years. Climate change, unforeseeable future projects, demographic changes, etc. make assumptions beyond this time frame speculative. These timeframes will apply for each action proposed in all alternatives.

Spatial boundary: The ten analysis units shown in Figure 1-2 [SNF, excluding wilderness areas, Research Natural Areas (RNAs) and Botanical Areas] where cross-country travel has been occurring.

Indicator(s): (1) Number of rare plant populations within analysis units. This indicator provides a way to compare Alternative 1 with the action alternatives for analysis units or portions of analysis units below 6800 feet where cross-country travel would be allowed to continue. An analysis unit with a higher number of species and populations of rare plants below 6800 feet elevation would be assumed to have a greater probability of direct and indirect impacts from cross-country travel than an analysis unit with fewer or less vulnerable species and populations.

Methodology: GIS analysis of existing unauthorized routes in relation to rare plant occurrences.

2. Direct and indirect effects of adding facilities (roads, motorized trails and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Short-term timeframe: 1 year (see above).

Long-term timeframe: 20 years (see above).

Spatial boundary: Analysis units (see above).

Indicator(s): (1) Number of plant populations within or adjacent to proposed facilities. This indicator is used to compare alternatives using the number of rare plant populations found within 100 ft of proposed facilities as this will take into account direct and indirect effects of motorized recreation, including parking one vehicle-length off motorized trails or roads; (2) Miles of proposed facilities open for motor vehicle use within riparian habitat, including meadows and streambanks. This is being used as a baseline indicator of how much riparian habitat is being affected by alternative. This includes streambanks, wet meadows, fens and some dry meadows as well.

Methodology: (1) Botanical survey of proposed motorized trails, roads and open areas; (2) GIS analysis of proposed facilities and sensitive plant sites/habitat.

3. Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads).

Short-term timeframe: 1 year (see above).

Long-term timeframe: 20 years (see above).

Spatial boundary: Analysis units (see above).

Indicator(s): (1) Number of rare plant populations or sensitive habitat areas affected by changes in road closures. Vehicle class has already been discussed as having no discernible difference in effect to botanical resources and so this will not be analyzed or discussed further. Some seasonal road closures will affect certain plant populations and/or sensitive plant habitat (e.g. fens, Botanical Areas) and these areas are analyzed to determine their effects.

Methodology: (1) GIS analysis of NFTS roads.

4. Non-significant LRMP Amendment

As explained in section 3.1.1 the non-significant LRMP amendments do not have unique effects when compared to the other actions analyzed in this FEIS. Therefore the environmental consequences have been analyzed and will not be discussed further in the botanical resources section.

Cumulative Effects

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial boundary: Rangeland for certain rare plant species; Forestwide for other species and guild/habitat areas. Certain rare plant species on the SNF have a distribution beyond the SNF, in which case effects to the metapopulation may be discussed (for the purposes of this analysis the metapopulation would be all populations within the Sierra Nevada).

Indicator(s): (1) Number of rare plant populations within or adjacent to proposed facilities. The alternatives are compared by evaluating how many rare plant occurrences occur within 100 feet of proposed motorized trails; (2) Miles of proposed facilities open for motor vehicle use within riparian habitat, including meadows and streambanks. As for rare plant populations, this indicator for riparian habitat will be contrasted between alternatives to display the relative impact of proposed actions on this guild. These indicators will tie to the direct and indirect effects discussion and allow for a comparative look at the cumulative effects among the alternatives as proposed and past, present and reasonably foreseeable future actions.

Methodology: (1) Botanical survey of proposed motorized trails, roads and open areas; (2) GIS analysis of all proposed facilities and sensitive plant sites/habitat.

3.11.2 Affected Environment

This section summarizes the affected environment for threatened, endangered and sensitive (TES) plant species on the SNF to set the stage for understanding how these resources are potentially affected by the proposed action and alternatives. More detailed information is found in the BA/BE for plants.

There are 47 Forest Service Sensitive Plant species and 2 Federally-listed species on the SNF list. Of these 49 TES plant species, 39 have the potential to be affected by the Travel Management alternatives, these are shown in Table 3- 111. Seven rare plant species are endemic to the SNF (Bolander's clover, carpenteria, Merced clarkia, Mono Hot Springs evening primrose, orange lupine, Rawson's flaming trumpet and Shuteye Peak fawn-lily).

Table 3- 111. Rare Plants Included in this Analysis

Name/Family	Status	Elev. Range (feet)	Habitat	Habitat Guild	Analysis Unit (AU)
<i>Allium yosemitense</i> YOSEMITE ONION Liliaceae	FS Sensitive, State Rare	1500-6900	Rocky talus and scree slopes, seeps and outcrops. Chaparral, foothill woodland, Lower and upper montane conifer forest	Rock outcrop	South Fork
<i>Botrychium ascendens</i> UPSWEPT MOONWORT Ophioglossaceae	FS Sensitive	6000-11000	Meadows, seeps and fens in montane and subalpine zones.	Riparian	Possible in higher elevation subalpine habitats.
<i>Botrychium crenulatum</i> SCALLOPED MOONWORT Ophioglossaceae	FS Sensitive	6000-11000	Meadows, seeps and fens in montane and subalpine zones.	Riparian	Possible in higher elevation subalpine habitats.
<i>Botrychium lineare</i> SLENDER MOONWORT Ophioglossaceae	FS Sensitive; Federal Candidate	6000-11000	Rocky/moist sites in montane and subalpine zones.	Riparian	Possible in higher elevation subalpine habitats.
<i>Botrychium lunaria</i> COMMON MOONWORT Ophioglossaceae	FS Sensitive	6000-11000	Meadows, seeps and fens in montane and subalpine zones.	Riparian	Possible in higher elevation subalpine habitats.
<i>Botrychium manganese</i> MINGAN MOONWORT Ophioglossaceae	FS Sensitive	6000-11000	Meadows, seeps and fens in montane and subalpine zones.	Riparian	Possible in higher elevation subalpine habitats.
<i>Botrychium montanum</i> MOUNTAIN MOONWORT Ophioglossaceae	FS Sensitive	6000-11000	Meadows, seeps and fens in montane and subalpine zones.	Riparian	Possible in higher elevation subalpine habitats.
<i>Bruchia bolanderi</i> BOLANDER'S CANDLE MOSS Moss	FS Sensitive	5000-7500	Endemic to meadows of the Sierra Nevada in the mixed conifer zone. Found on vertical banks of streams	Riparian	Tamarack-Dinkey

Name/Family	Status	Elev. Range (feet)	Habitat	Habitat Guild	Analysis Unit (AU)
<i>Calyptidium pulchellum</i> MARIPOSA PUSSYPAWS Portulacaceae	Federally listed – Threatened	1500-4000	Decomposed granite gravel associated with outcrops in foothill woodland and chaparral	Rock outcrop	Jose-Chawanakee
<i>Camissonia sierrae ssp. alticola</i> Endemic MONO HOT SPRINGS EVENING-PRIMROSE Onagraceae	FS Sensitive	4500-8500	Gravel and sand pans and ledges associated with outcrops in chaparral, ponderosa pine, mixed conifer and red fir/lodgepole forests	Rock outcrop	Gaggs; Stump Springs-Big Creek; East of Kaiser Pass
<i>Carlquistia muirii</i> MUIR'S TARPLANT Asteraceae	FS Sensitive	4000-7000	Granite or metamorphic outcrops, in ledges or cracks and gravel flats. In montane chaparral and conifer forest	Rock outcrop	Tamarack-Dinkey
<i>Carpenteria californica</i> (CACA) CARPENTERIA, TREE ANEMONE Philadelphaceae	FS Sensitive: State listed Threatened	1500-4400	Chaparral, foothill woodland, lower ponderosa pine forest. Concentrated in draws and moist areas but found on open dry slopes as well.	Chaparral, Riparian	Mammoth; Jose-Chawanakee
<i>Clarkia biloba ssp. australis</i> MARIPOSA CLARKIA Onagraceae	FS Sensitive	1000-2500	Chaparral, foothill woodland, only in Merced River Canyon within 2 miles of S. Fork confluence	Chaparral	South Fork
<i>Collomia rawsoniana</i> Endemic RAWSON'S FLAMING TRUMPET Polemoniaceae	FS Sensitive	2000-7000	Along streams and around meadows in ponderosa pine and mixed conifer forest, sometimes in open forest where subsurface moisture is present	Riparian	Westfall; Gaggs; Mammoth
<i>Cypripedium montanum</i> MOUNTAIN LADY'S-SLIPPER Orchidaceae	FS Sensitive	4000-7200	Moist areas and dry slopes in late-successional conifer forest.	Forested, Riparian	Westfall

Name/Family	Status	Elev. Range (feet)	Habitat	Habitat Guild	Analysis Unit (AU)
<i>Dicentra nevadensis</i> TULARE COUNTY BLEEDING HEART Papaveraceae	FS Sensitive	7500-10000	Alpine fell fields, gravelly crevices and openings in subalpine conifer forest Only known occurrence on SNF is in John Muir Wilderness	Rock outcrop; Forested	Known within ¼ mile of Dinkey-Kings, possible elsewhere.
<i>Epilobium howellii</i> SUBALPINE FIREWEED Onagraceae	FS Sensitive	5000-8800	Streamsides, wet meadows and mossy seeps in subalpine conifer forest	Riparian	Globe; Stump Springs- Big Creek; East of Kaiser Pass; Tamarack-Dinkey; Dinkey-Kings
<i>Erigeron aequifolius</i> HALL'S DAISY Asteraceae	FS Sensitive	5200-8000	Steep, rocky ridges and in crevices in mixed conifer forests. Only SNF occurrence is on limestone at 5900' in Monarch Wilderness	Rock outcrop	Only known from the Monarch Wilderness but could occur in Dinkey-Kings.
<i>Eriophyllum congdonii</i> CONGDON'S WOOLLY SUNFLOWER Asteraceae	FS Sensitive	1850-6000	Cracks and talus of metamorphic rocks, mostly on steep inaccessible slopes in chaparral, foothill woodland, lower montane conifer forest	Rock outcrop	South Fork
<i>Erythronium pluriflorum</i> Endemic SHUTEYE PEAK FAWN LILY Liliaceae	FS Sensitive	6500-9000	Rocky open sites as well as meadow-type sites in red fir/lodgepole forest and in subalpine conifer forest	Riparian; Rock outcrop	Gaggs
<i>Fissidens aphelotaxifolious</i> BROOK POCKET-MOSS Moss	FS Sensitive	0-6300	Wet soil and rocks near streams, waterfalls and drainages where peak flow does not occur	Riparian	Gaggs

Name/Family	Status	Elev. Range (feet)	Habitat	Habitat Guild	Analysis Unit (AU)
<i>Helodium blandowii</i> BLANDOW'S BOG-MOSS Moss	FS Sensitive	6500-9000	Wet meadows, fens and seeps in subalpine coniferous forests	Riparian	Not confirmed yet on SNF with nearest location on the INF
<i>Horkelia parryi</i> PARRY'S HORKELIA Rosaceae	FS Sensitive	0-3500	Dry, open areas in chaparral, with partial to full shade; often with live oaks. Prefers slightly to moderately acidic soils	Chaparral	South Fork
<i>Peltigera hydrothyria</i> VEINED WATER LICHEN Lichen	FS Sensitive	4000-8000	Cold, clear, unpolluted streams in conifer forests.	Riparian	Westfall; Gags; Tamarack-Dinkey
<i>Hulsea brevifolia</i> SHORT-LEAVED HULSEA Asteraceae	FS Sensitive	5000-9000	Granitic or volcanic soils in mixed conifer and red fir forest	Forested	Westfall; Globe; Stump Springs-Big Creek; Tamarack-Dinkey
<i>Leptosiphon serrulatus</i> MADERA LEPTOSIPHON Polemoniaceae	FS Sensitive	1000-4100	Dry slopes in oak woodland and lower montane coniferous forest. Usually in decomposed granite gravel, one instance on serpentine.	Chaparral; Forested	Stump Springs-Big Creek
<i>Lewisia congdonii</i> CONGDON'S LEWISIA Portulacaceae	FS Sensitive	1900-7000	Rock faces, cracks and ledges; scree and talus. Metamorphics or granitics. Chaparral and conifer forest.	Rock outcrop	South Fork
<i>Lewisia disepala</i> YOSEMITE LEWISIA Portulacaceae	FS Sensitive	4000-7500	Granitic sand and gravel in ponderosa pine, mixed conifer and upper montane coniferous forest	Rock outcrop	Westfall; Mammoth; Dinkey-Kings
<i>Lewisia kelloggii</i> ssp. <i>kelloggii</i> KELLOG'S LEWISIA Portulacaceae	FS Sensitive	6000-11000	Open, gravelly flats in mixed conifer and subalpine forest	Rock outcrop	Gags

Name/Family	Status	Elev. Range (feet)	Habitat	Habitat Guild	Analysis Unit (AU)
<i>Lupinus citrinus</i> var. <i>citrinus</i> Endemic ORANGE LUPINE Fabaceae	FS Sensitive	1500- 5500	Granitic sand and gravel on flats and pans of outcrops and in coarse soil adjacent to outcrops. Chaparral, foothill woodland, ponderosa pine and mixed conifer forest.	Rock outcrop	Stump Springs-Big Creek; Jose-Chawanakee; Dinkey-Kings
<i>Meesia triquetra</i> THREE-RANKED HUMP MOSS	FS Sensitive	6000- 8000	Fens in montane meadows in conifer forest.	Riparian	Gaggs; Globe; Mammoth; Stump Springs-Big Creek; Tamarack-Dinkey; Dinkey-Kings
<i>Meesia uliginosa</i> ONE-NERVED HUMP MOSS	FS Sensitive	7500- 9000	Saturated meadows at upper elevations of mixed conifer forest and red fir/lodgepole forest	Riparian	The only known occurrence is about 1 mile east of the boundary of Dinkey-Kings, however habitat exists in many AUs.
<i>Mielichhoferia elongata</i> Moss	FS Sensitive	0-3550	Metamorphic, sedimentary, limestone or serpentine soils with high copper content. Usually chaparral or foothill woodland	Rock outcrop	South Fork
<i>Mimulus filicaulis</i> SLENDER- STEMMED MONKEYFLOWER Scrophulariaceae	FS Sensitive	3900- 5700	Vernally moist sites in foothill woodland, conifer forest	Other	Near South Fork. Not yet confirmed on the SNF although the type specimen is Snow Creek, near the SNF boundary.

Name/Family	Status	Elev. Range (feet)	Habitat	Habitat Guild	Analysis Unit (AU)
<i>Mimulus gracilipes</i> SLENDER-STALKED MONKEY FLOWER Scrophulariaceae	FS Sensitive	1500-4225	Open gravelly areas in chaparral, ponderosa pine forest (often in burns and disturbed areas)	Rock outcrop, Chaparral	Jose-Chawanakee; Dinkey-Kings
<i>Mimulus pulchellus</i> PANSY MONKEY FLOWER Scrophulariaceae	FS Sensitive	1950-6500	Vernally wet areas in conifer forest (not yet found on the SNF)	Riparian, Forested	Only known sites are near South Fork; not yet known on SNF.
<i>Ribes menziesii</i> var. <i>Ixoderme</i> AROMATIC CANYON GOOSEBERRY Grossulariaceae	FS Watch List	1800 – 3500	Chaparral and cismontane woodland.	Chaparral	Dinkey-Kings
<i>Sidalcea keckii</i> KECK'S CHECKER-BLOOM	Federally listed: Endangered	400-1500	Serpentine or clay soils in valley and foothill grasslands, woodlands, or chaparral.	Other	Only known sites are near Dinkey-Kings; not yet known on SNF
<i>Trifolium bolanderi</i> BOLANDER'S CLOVER Fabaceae	FS Sensitive	6500-7500	Montane meadows in mixed conifer and upper montane conifer forest/ mesic	Riparian	Westfall; Gagg's; Globe; Tamarack-Dinkey; Dinkey-Kings

The remainder of the ten SNF TES plant species do not occur or have habitat where motor vehicle use takes place, thus they will not be analyzed in this FEIS; these are shown in Table 3-112. Note: The Federally listed species, *Sidalcea keckii* is excluded from further analysis.

Table 3- 112. Rare Plants Excluded from Further Analysis

Name and Family	Fed/State	Elev. Range (feet)	Habitat	Rationale for excluding from analysis
<i>Clarkia lingulata</i> Endemic MERCED CLARKIA Onagraceae	State listed Endangered	1000-2500	Chaparral, foothill woodland, Merced River Canyon only	The two known populations are in South Fork Analysis Unit along Highway 140. None are subject to motorized travel impacts because of the steepness and inaccessibility of the slopes.
<i>Delphinium inopinum</i> UNEXPECTED	FS Sensitive	6000-9000	Rocky sites in upper montane conifer forest	This species is primarily a southern Sierran species,

Name and Family	Fed/State	Elev. Range (feet)	Habitat	Rationale for excluding from analysis
LARKSPUR Ranunculaceae			(Monarch Wilderness)	with its northern distributional limit in the Monarch Wilderness about 5 miles east of the Dinkey-Kings Analysis Unit.
<i>Draba sharsmithii</i> MT. WHITNEY DRABA Brassicaceae	FS Sensitive	Above 11000'	Talus in subalpine forests and alpine fell-fields, on dry granitic sands and gravels or in protected rock crevices.	Only known occurrence is in wilderness, outside of the project area.
<i>Eriogonum nudum</i> var. <i>regivirum</i> KINGS RIVER BUCKWHEAT Polygonaceae	FS Sensitive	700-2000	Carbonate slopes in chaparral and foothill woodland.	The only known occurrence is in the Kings River Special Management Area, outside of the project area.
<i>Heterotheca monarchensis</i> MONARCH GOLDENASTER Asteraceae	FS Sensitive	5700-6000	Limestone cracks, ledges and sandy flats at base of cliffs surrounded by canyon live oak woodland.	Known from three occurrences on a limestone formation northeast of the Horseshoe Bend of the Kings River near Boyden Cave.
<i>Lupinus gracilentus</i> SLENDER LUPINE Fabaceae	FS Sensitive	8000-11,500	Subalpine coniferous forest.	Only known SNF occurrence is in wilderness and National Parks adjacent to the project area. Not found during field surveys.
<i>Lupinus lepidus</i> var. <i>culbertsonii</i> HOCKETT MEADOW LUPINE Fabaceae	FS Sensitive	8000-10,000	Meadows, subalpine coniferous forests on mesic rocky sites.	Not yet found in the SNF, not likely to occur within project area.
<i>Petrophyton caespitosum</i> ssp. <i>acuminatum</i> MARBLE ROCKMAT Rosaceae	FS Sensitive	3900-7550	Lower to upper coniferous forests on carbonate or granitic, rocky substrates	Not yet found in SNF, nearest location is Boyden Cave region – habitat precludes threats for the most part.
<i>Streptanthus fenestratus</i> TEHIPITE VALLEY JEWEL-FLOWER Brassicaceae	FS Sensitive	4000-7000	Lower montane conifer forest, Upper montane conifer forest	Only known occurrence is in wilderness in the vicinity of Tehipite Valley, outside the project area.
<i>Viola pinetorum</i> ssp. <i>grisea</i> GREY-LEAVED VIOLET Violaceae	FS Sensitive	(4875) 8,000-11050	Dry peaks and slopes in subalpine zone.	In SNF, only known from the wilderness at high elevations. Lower elevation populations are found in San Bernardino NF.

Please see the Biological Assessment/Biological Evaluation for TES Plants for further details.

Habitat Type Guilds

As introduced above in the Effects Methodology section, gauging effects to rare plants can be facilitated by using the concept of habitat type guilds. While the rare plant species known or suspected to occur in the analysis area vary widely in their ecological requirements and life history characteristics, many occur in similar broad habitat types where the effects of motor vehicle use are comparable. For the purposes of this analysis, the rare plant species being considered have been grouped into guilds, based on general habitat requirements. A species may occur in one or more guilds. The guilds are summarized below:

Riparian Guild

Riparian areas are areas between wetlands and uplands (Potter 2005) that are continually, partially or periodically inundated with water. This also extends to areas that contain a water source such as a spring or seep that is below ground. Riparian habitats under this guild include streamsides, lakeshores, wet meadows, fens, springs and seeps. Vegetation in these areas depend on the close proximity of water for optimal growth; riparian plant communities tend to be distinct from surrounding areas in that they usually have higher species diversity of plants and animals than adjacent upland habitats on the SNF. Fens are areas of peat accumulation (at least 40 cm [15.7 inches] or organic horizons within the upper 80 cm [31.5 inches] of soil) where organic matter production exceeds the rate of decomposition (Weixelman and Cooper, 2009). Fens are sensitive to hydrological changes and are not easy to restore once degraded (rates of peat accumulation in the Rocky Mountains are between 4 and 16 inches per thousand years (Chimner and Cooper, 2002). Although fens comprise a small percentage of the land base, even of the relatively small meadow land base, they are disproportionately important to plant biodiversity because they provide habitat for several rare moss and vascular plant species (Weixelman and Cooper, 2009).

Forested Guild

For the purposes of this analysis, forested habitats are characterized as areas of developed, non-riparian soils within the boundaries of a stand of trees, usually mixed-conifer or other coniferous forest types on the SNF. These areas have at least partial canopy cover and species are adapted to lower light conditions than species of rock outcrops. Many rare plant species on forested sites require mycorrhizae or a duff layer in order to survive.

Rock Outcrop Guild

Rock outcrop habitats are open, sunny areas of prominent granitic, metamorphic, volcanic or carbonate rock formations that contain little organic matter but may have eroded material in shallow depressions or cracks. These features contain the substrate that rock outcrop species thrive on, as there is usually little competition from surrounding vegetation that requires organic materials. This habitat is fairly common on the SNF across all analysis areas.

Chaparral Guild

The mixed chaparral of the SNF foothills is a unique type that has not been well-represented in classifications of California vegetation (e.g. Sawyer and Keeler-Wolf 1995). SNF mixed chaparral is dominated by sclerophyllous shrubs in lower elevations, south aspects or shallow-soil areas. This is a fire-adapted vegetation type with shrubs that recover from fire by sprouting, producing seedlings or both. Dominant species in this type of chaparral are buckbrush (*Ceanothus cuneatus*), chaparral whitethorn (*C. leucodermis*), yerba santa (*Eriodictyon californicum*),

Mariposa manzanita (*Arctostaphylos viscida* ssp. *mariposa*), redberry (*Rhamnus ilicifolia*) and mountain mahogany (*Cercocarpus betuloides*). In most of the Madera and Fresno county portions of the Forest, there is a conspicuous absence of chamise (*Adenostoma fasciculatum*), which is a dominant of chaparral in much of California. In Mariposa County, typical chamise chaparral is abundant. Montane chaparral is found in areas above 5000 ft where frequent fires or poor soils occur, but the rare plant species of interest in this analysis are not found in montane chaparral as a rule.

Analysis Units

As described in the introduction to Chapter 3, analysis units were devised to divide the SNF into areas defined by geographic and transportation boundaries that would be easily understood by the public on a map. The following is a summary of botanical resources found within each analysis unit:

South Fork Analysis Unit (SFM)

This analysis unit includes the Devil's Peak Botanical Area. Most of the rare plant populations are not threatened by motor vehicle impacts because they grow in areas inaccessible to vehicles. Rare plant species known to occur in this analysis area are: Mariposa clarkia, Merced clarkia, Yosemite onion, Congdon's lewisia, Congdon's woolly sunflower, and Parry's horkelia. There are six known noxious weed species.

Westfall Analysis Unit (WES)

Several fens occur in this unit. There are six known sensitive plant species: the mountain lady's slipper orchid, Rawson's flaming trumpet, three-ranked hump moss, veined water lichen and Yosemite bitterroot. There are eight known noxious weed species.

Globe Analysis Unit (GLO)

The sensitive plant species known to occur in this unit are: mountain lady's slipper orchid, Bolander's clover, three-ranked hump moss, veined water lichen, and short-leaved hulsea. There are three known noxious weed species.

Gaggs Analysis Unit (GAG)

There are eight known sensitive plant species in this unit: two endemic species are almost entirely contained within this area, including the Shuteye Peak fawn lily and Rawson's flaming trumpet. In addition; short-leaved hulsea, Mono Hot Springs evening primrose, Bolander's clover, brook pocket moss, Kellogg's lewisia, subalpine fireweed, and veined water lichen are known to occur in this unit. There are five known noxious weed species.

Mammoth Analysis Unit (MAM)

The following rare plant species are known to occur in this unit: carpenteria (tree anemone – the only Madera County population), Yosemite lewisia, Mono Hot Springs evening primrose, three-ranked hump moss, subalpine fireweed, and Rawson's flaming trumpet. There are three known noxious weed species.

Stump Springs-Big Creek Analysis Unit (SSB)

The sensitive plant species known to occur in this unit are: Mono Hot Springs evening primrose, short-leafed hulsea, subalpine fireweed, and three-ranked hump moss. There are three known noxious weed species.

East of Kaiser Pass Analysis Unit (EKP)

The rare plant species known to occur in this unit are subalpine fireweed, and Mono Hot Springs evening primrose. There are three known noxious weed species.

Jose-Chawanakee Analysis Unit (JCH)

This analysis unit contains the two SNF populations of the Federally threatened Mariposa pussypaws as well as the bulk of the populations of carpenteria. Other rare plant species known to occur in this unit are: orange lupine and slender-stalked monkey flower. There are seven known noxious weed species.

Tamarack-Dinkey Analysis Unit (TAD)

The rare plant species known to occur in this unit are: short leafed hulsea, three-ranked hump moss, Bolander's candle moss, subalpine fireweed, and Bolander's clover. There are five known noxious weed species.

Dinkey-Kings Analysis Unit (DNK)

A large number of central Sierra endemic species are found in this unit including Yosemite lewisia orange lupine and tree anemone. Other rare plants occurring in this area are three-ranked hump moss, Bolander's clover, veined water lichen, Muir's tarplant, and Tulare County bleeding heart. There are eight known noxious weed species.

Summary of Analysis Unit Data

Table 3- 113 displays rare plant occurrences by analysis unit. Plant species in the table are ones known to occur in the project area (also see Table 3- 111). This was done in order to give a sense of the amount of potential impact posed by Alternative 1. This data represents all known occurrences within an analysis unit; this is not an effects summarization but rather a tool to understand the relative scope of the project area relative to the proposed actions.

Table 3- 113. Rare Plant Occurrences by Analysis Unit on the SNF

Plants*	SFM	WES	GAG	GLO	MAM	SSB	EKP	JCH	TAD	DNK	Total
ALYO	2										2
BRBO				1					3		4
CACA					1			5		8	14
CAMU									1	5	6
CAPU								2			2
CASIA			1			4	7				12
CLBIA	7										7
CLLI	2										2
CORA		2	61		8						71
CYMO		13									13
EPHO			4	24		4	1		28	26	87
ERCO	9										9
ERNUR										1	1
ERPL			5								5
ERPRA ¹			3	3							6
HAPY	1										1
HOPA	3										3
HUBR		1		5		8			23		37
LECO	5										5
LEDI		2			5					5	12
LEKE			3								3
LESE						2					2
LUCIC						1		65		35	101
METR			2	7	3	2			6	7	27
MIGR								6		1	7
PEHY		4	4						2	2	12
RIME ¹										1	1
TRBO		1	1	24					7	5	38
Total	29	23	84	64	17	21	8	78	70	97	490

* See environmental consequences section for plant codes; ¹watch list species

3.11.3 Environmental Consequences

See the effects analysis methodology section above regarding how this analysis was conducted.

Alternative 1 – No Action

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

General effects to rare plants from uncontrolled motor vehicle use include crushing and killing of plants (Wilshire, Shipley and Nakata 1978). Indirect effects to plants can occur when habitat is altered due to soil erosion, soil compaction, increase in bare soil, introduction of noxious weeds, reduction in vegetation cover, shift in community composition and fugitive dust. Soil erosion can either remove suitable topsoil required for germination of rare plants or eroded soil can be deposited onto existing plants, depriving them of light or crushing them. Compacted soils affect

infiltration rates of precipitation, causing increased surface runoff and diverting water from plants; compaction can also affect root growth and seed germination, forcing roots to spread out to find more friable soil and hampering the ability of seedlings to put roots out (Brooks and Berry 2006). Repeated crushing of plants by motor vehicles can eventually kill them (Groom, 2007); and the resultant absence of plant cover, along with soil compaction, can lead to increased bare soil in areas that formerly were suitable for plant establishment. Increased vehicle use can bring in propagules of invasive non-native plants and noxious weeds from infested areas (Sheley, 1999; Rooney, 2005). When this is combined with the disturbance soil and reduction of native vegetation by motor vehicles, the spread of noxious weeds can increase dramatically (Rooney 2005). Areas of high motor vehicle use that were dominated with native shrub species have undergone shifts to forb and grass-dominated communities (Payne, Foster and Leininger 1983). Finally, fugitive dust from motor vehicle use in dry areas can impact plants by inhibiting photosynthesis and reproductive ability (MWLAP and GCC 2004).

The overall direct and indirect effects of the no action alternative (outside of the discussion of the Forest Order in the above section) are discussed below for rare plant species, organized by guilds.

RIPARIAN GUILD

Rare moonworts: *Botrychium* species (*Botrychium ascendens*, *B. crenulatum*, *B. lineare*, *B. lunaria*, *B. manganese*, *B. montanum*)

This group of species is found in montane and subalpine habitats in areas of non-granitic parent material (Colwell et al, 2009), usually in wet or moist meadows, fens, seeps and even some stands of some trees. While the only currently known populations in the SNF are in wilderness areas, there is potential habitat in the analysis units. The largest threat to habitat for these species from motor vehicle use is alteration of hydrologic functioning due to ruts or compaction that changes drainage patterns. This could affect water tables, pH, infiltration, water temperature, and pollute the water with petroleum products. Wet meadows and fens could suffer the most from these effects, although fens within 200 ft of unauthorized routes are probably the most susceptible. Rare moonworts may be negatively affected if undiscovered populations occur where cross-country motor vehicle riding intensifies.

Rawson's flaming trumpet- *Collomia rawsoniana* (CORA)

There are over 63 occurrences of flaming trumpet on the Bass Lake Ranger District, primarily in Gaggs analysis unit. Because many populations are extensive and grow in areas of riparian habitat where motor vehicle riding is not generally occurring, it is not expected to be severely threatened by unauthorized motor vehicle use. Indirect effects could include erosion of soil into riparian habitat and increased sedimentation of streams, which could alter germination and establishment of new populations of Rawson's flaming trumpet within portions of its range.

Subalpine fireweed- *Epilobium howellii* (EPHO)

Approximately 87 occurrences of subalpine fireweed are found within the analysis units. Many are in close proximity to NFTS roads and trails and in some cases seem to thrive on a certain amount of disturbance. While risk of direct damage from unauthorized motor vehicle traffic is likely due to the amount of known occurrences, the affinity of subalpine fireweed for disturbed areas lessens the concern for irreversible damage from motor vehicles to this species. Indirect effects of fugitive dust, hydrologic alteration and invasive plant dispersal could also pose some risks to SNF populations.

Shuteye Peak fawn lily - *Erythronium pluriflorum* (ERPL)

With five large populations centered on Shuteye Peak in the Gaggs analysis unit, this endemic species is at some risk from motor vehicle impacts. There are hundreds of thousands of plants in

this area, most of which are not accessible by motor vehicles. Under Alternative 1, cross-country motor vehicle travel would impact individual plants for the populations that are accessible to motor vehicles. The risk of negative direct and indirect effects to this species from this alternative is significantly higher than those from the proposed action (Alternative 2), Alternative 3, Alternative 4 and/or Alternative 5. However, the overall risk from this alternative to Shuteye Peak fawn lily is in possible damage or death of individual plants on a limited scale.

Brook pocket moss - *Fissidens aphelotaxifolius*

The brook pocket-moss is only known from two sites in California, one in the Sierra National Forest along Owl Creek at about 6300 feet (Madera County). The species grows on wet soil, humus and rocks along narrow streams and in the vicinity of small waterfalls, and in damp or wet crevices of cliffs (Pursell 1976). It is not expected in areas where peak flows wash mosses away. The species occurs from sea level to 6300 feet. Direct effects to the one known location are unlikely as plants grow under a rock near a small waterfall, but direct and indirect effects are possible if additional unknown occurrences exist in more accessible areas. Direct effects could be crushing and killing of plants if they were to be driven over, and indirect effects could be the deposition of sediment onto plants or the loss of streambank habitat due to erosion.

Blandow's bog-moss - *Helodium blandowii*

A moss species associated with montane fens, seeps and wet meadows, it is thought to exist on the SNF but has not yet been discovered during surveys. As it requires inundation, maintenance of hydrologic functions for riparian features is important. Unauthorized motor vehicle activity across the forest would likely impede functioning of some of these features and may degrade habitat for this species.

Three-ranked hump moss - *Meesia triquetra* (METR)

As a species of wet meadows or fens, this moss may not be at high risk from direct effects of motor vehicle use but rather is at risk from indirect effects of such use. Indirect effects could include soil erosion and/or deposition into riparian areas and alteration of meadow or fen hydrology, to which this species is particularly sensitive (Cooper, Chimner and Wolf 2005). For example, lowering of the water table in a fen when headcuts result from ruts caused by tires could negatively affect current populations. Some direct impacts may occur when plants are driven on (though generally vehicles do not drive in meadows or riparian areas). Over 27 occurrences of three-ranked hump moss are known within the Alternative 1 area, with some at higher risk of suffering negative effects than others, due to greater accessibility of certain meadows or riparian features to vehicles.

Pansy monkeyflower - *Mimulus pulchellus* (MIPR)

This particular species has not been confirmed on the SNF but potential habitat exists for it and so it is assumed to be within the project area (most likely in the South Fork analysis unit). Its habitat consists of open, vernal wet areas in coniferous forests. It is assumed that this habitat type could have at least some negative impacts from cross-country motor vehicle use.

Veined water-lichen- *Peltigera hydrothyria* (PEHY)

An aquatic lichen (formerly *Hydrothyria venosa*) found in unpolluted montane streams, at least twelve populations could be affected under Alternative 1. This species has been used to determine the relative water quality of montane streams (Davis 1999). Unauthorized motor vehicle activity has been observed at stream crossings, thus direct and indirect effects to this species can be assumed. Direct effects from tire impacts are possible but indirect effects from sedimentation and erosion of stream channels can have a large impact on this lichen, due to its preference for clear

stream water, preferred substrate and specific hydrologic conditions. Several occurrences could be affected enough to decrease the amount of occupied stream reach occupied by the lichen.

Bolander's clover- *Trifolium bolanderi* (TRBO)

Spread across the SNF in montane wet meadows, this species is known from 38 populations in the Alternative 1 area. Unauthorized use of motor vehicles could lead to direct impact for this species if vehicles were to drive in meadows, but indirect effects from soil erosion and alteration of hydrology would be more likely. Because many of the populations are extensive the species is not at high risk under this alternative, but the possibility is greater than under the other alternatives for a decrease in size or vigor of individual populations (if indirect effects were to continue and result in a cumulative watershed effect over the long term).

OVERALL RIPARIAN EFFECTS

In Alternative 1 there are 4.65 miles of unauthorized routes within meadows and other riparian features. This compares to Alternatives 2, 3, and 4 with 0 miles and Alternative 5 with 0.08 miles of proposed facilities within meadows and other riparian features.

CHAPARRAL GUILD

Carpenteria- *Carpenteria californica* (CACA)

Carpenteria is a medium to tall shrub. Thus, most carpenteria populations would not be as likely to experience direct effects from motor vehicle use as herbaceous plants. With 14 populations and some of those quite extensive, the species is not in danger of extirpation or severe damage. However, unauthorized motor vehicle use could damage some individual shrubs. Cross-country travel in areas where seedlings are establishing could result in direct effects to the fragile seedlings, jeopardizing the maintenance of adequate genetic variability over the long term.

Parry's horkelia- *Horkelia parryi* (HOPA)

Parry's horkelia is known from three robust occurrences (one of which is just over 2 acres) in the South Fork analysis unit. Cross-country motor vehicle riding could crush plants and fragment the populations into smaller units over time. Possible indirect effects would be the introduction and spread of noxious weeds on the wheels of motor vehicles, and the rapid establishment of weeds in areas of increased soil disturbance.

Madera linanthus- *Leptosiphon serrulatus* (LESE)

Two known populations of Madera linanthus are found on the SNF on steep roadside banks. Direct effects from motor vehicle use cannot be ruled out but they will likely have little impact as the known populations would not be easily accessed by motor vehicles. Indirect effects from erosion caused by unauthorized routes above a given population would be more likely to affect habitat for this species.

ROCK OUTCROP GUILD

Yosemite onion- *Allium yosemitense* (ALYO)

With three populations (out of six known for the species) on the SNF, Yosemite onion populations are in inaccessible areas not likely to experience negative impacts of motor vehicle use.

Mono Hot Springs evening primrose- *Camissonia sierrae* ssp. *alticola* (CASIA)

Twelve populations of Mono Hot Springs evening primrose are found in areas that are subject to motor vehicle activity. See the Forest Order discussion in the beginning of this alternative for

changes to this analysis. Indirect effects from past motor vehicle activity would continue to impact some populations. These effects would be altered soil deposition, oil, gas and nitrate pollution and inadvertent invasive plant dispersal. Because of this species' location in the areas where cross-country motor vehicle travel is currently prohibited, the risk of overall negative effects are relatively small.

Mariposa pussypaws (Federally Threatened) - *Calyptidium pulchellum* (CAPU)

There are two known populations of Mariposa pussypaws in the SNF with both occurring in the Jose-Chawanakee analysis unit. These populations are located at elevations between 2500 and 3500 ft on granitic outcrops. Under this alternative direct effects are not expected to occur as the two populations are fenced off but indirect effects could be substantial over time. Soil deposition can easily cover the fine gravel substrate this plant requires and therefore could be impacted by high, unauthorized motor vehicle use. Jose Basin, where these populations are located, is currently popular for motor vehicle riders and has a plethora of unauthorized routes. Additionally, the relatively low reproductive capacity and annual status of the species makes it more susceptible to environmental perturbations (Hinton 1975). Due to the allowance of unrestricted motor vehicle travel, the U.S. Fish and Wildlife (USFWS) design criteria for Mariposa pussypaws (USDI-USFWS 2007) could not be implemented in this alternative. This alternative does not restrict cross-country travel or add NFTS facilities. The USFWS criteria are for designating currently unauthorized routes, not restricting current motor vehicle travel on the SNF.

Muir's tarplant- *Carlquistia muirii* (CAMU)

Six populations of this species are known in the no action alternative area, with the majority located in the Dinkey-Kings analysis unit. Though most of these populations are located on extremely rough terrain features (steep rock outcrops), there is some risk of direct effect to the species from unauthorized motor vehicle use as the number of populations are near roads and therefore theoretically accessible. Indirect effects from soil erosion could be more damaging to the plant but lack of accessibility would dampen negative effects.

Congdon's woolly sunflower- *Eriophyllum congdonii* (ERCO)

All nine occurrences for this species are concentrated in the South Fork analysis unit. Unauthorized motor vehicle activity poses a threat to this species but direct effects would likely be small as areas are hard to access. Soil erosion is an indirect effect that poses a larger impact to the species, as deposition from eroded unauthorized routes could cover existing plants while also covering areas that could germinate new seedlings.

Congdon's lewisia- *Lewisia congdonii* (LECO)

Another endemic species with only five populations located exclusively within the South Fork analysis unit, this plant faces a slight risk from direct effects of unauthorized motor vehicle use. For the most part, plants grow where the terrain is inaccessible to motor vehicles.

Yosemite lewisia- *Lewisia disepala* (LEDI)

Yosemite lewisia has ten populations on the SNF spread between Dinkey-Kings, Gags and Mammoth analysis units. The populations are located mostly on open granitic outcrop areas in mixed-conifer forest that are attractive to motor vehicle users. One area (Quarry Dome) had to be rocked off in places in 2006 to discourage riders from driving over gravel pans that form the main habitat for this species (Tuitele-Lewis 2006). Although its distribution spans across the central Sierras, the populations on the SNF would be at risk from direct effects of motor vehicle use due to the preference of riders for these granitic habitat areas. Extirpation of many populations on the SNF from direct and indirect effects, although unlikely, could occur under this alternative.

Orange lupine- *Lupinus citrinus* var. *citrinus* (LUCIC)

Found on the same granitic habitat as slender-stemmed monkeyflower and Yosemite lewisia, this species is much more common on the SNF than any other granitic habitat plant. Approximately 101 occurrences are known, with most of the occurrences found in Dinkey-Kings and Jose-Chawanakee analysis units. As it is so closely affiliated with granitic outcrops and gravel pans, this makes it susceptible to unauthorized motor vehicle activity and subsequent damage from being driven over. It is likely that several populations may be affected; some populations would likely be extirpated under this no action alternative. Complete extirpation of the species on the SNF is unlikely but significant effects to population health are probable.

Slender-stemmed monkeyflower- *Mimulus filicaulis* (MIFI)

The nearest known location to the SNF is the type locality, given as “Snow Creek” near Darrah. If there are undiscovered populations on the SNF, there is some risk of damage from motor vehicle riding.

Slender-stalked monkeyflower –*Mimulus gracilipes* (MIGR)

Approximately seven populations of this species are known on the SNF at this time with the focal point being in Jose–Chawanakee analysis unit. Their affiliation with gravel pans and open granitic areas make them particularly susceptible to unauthorized motor vehicle use. That susceptibility is increased by the accessibility of most of the locations to motor vehicles. Jose-Chawanakee has relatively accessible and attractive terrain for motor vehicles and the granitic pans that composes the habitat for this species are often open, increasing the likelihood of direct and indirect impacts. Viability of the species on the SNF could be compromised by the no action alternative in the absence of monitoring and conservation measures.

FORESTED GUILD

Mountain lady’s-slipper- *Cypripedium montanum* (CYMO)

Due to its sensitive habitat requirements and physiology (Kaye and Cramer 2005), disruption or extirpation of mountain lady-slipper populations has a stronger effect on the viability of individuals or populations relative to some other forested TES species. All thirteen populations in the no action alternative area are at some risk from motor vehicle use, especially so as their focused population distribution is in an area with high amounts of recreational motor vehicle activity (Westfall analysis unit). Effects from cross-country motor vehicle use would likely damage some populations, reducing the plants health on the SNF. Extirpation of individual occurrences is unlikely but cannot be ruled out.

Short-leaved hulsea- *Hulsea brevifolia* (HUBR)

Though endemic to the central Sierra, this species is found extensively in higher elevations (5500-8000 ft) across the SNF. With 41 large populations known in the no action alternative area, the species is not at high risk from unauthorized motor vehicle use but would suffer a notable decline in health and loss of individual populations. As much of the habitat is under partial or full canopy of larger red fir trees and often not far from roads or trails, there exists some risk of direct effects to individuals and occurrences; however, the magnitude of that effect is harder to estimate but likely is moderate (risk of extirpation of species is very low but damage to individual SNF populations could be high).

OTHER HABITAT

Mariposa clarkia- *Clarkia biloba* ssp. *australis* (CLBIA)

At risk from unauthorized motor vehicle use but would not likely be extirpated due to the proximity to already disturbed areas, existing roads and steep local terrain. Direct effects from unauthorized motor vehicle use includes crushing of plants; indirect effects would encompass

erosion of soil from plant populations, deposition onto plants and the dispersal of invasive plant seeds and propagules in Mariposa clarkia habitat. A decrease in population numbers (seven populations known on the SNF) is unlikely but cannot be dismissed. A small to moderate reduction in health and fecundity of Mariposa clarkia plants is more likely.

Keck's checkerbloom – *Sidalcea keckii* (SIKE)

With cross-country travel allowed, because there is a small amount of suitable habitat in the southwestern portion of the Forest, there is a slight chance that undiscovered populations of Keck's checkerbloom could experience direct effects if plants were to be driven over during their growing cycle, or indirect effects if habitat were altered by soil compaction or erosion.

OVERALL EFFECTS

General effects to TES plants in Alternative 1 would be at least moderately negative, with some species receiving more negative direct and indirect effects than others. Species from the rock outcrop and riparian guilds are likely to have more impacts from the continuation of unauthorized motor vehicle travel, due to their particular environmental constraints and sensitivity to changes in those physical environments. Significant reductions in population health are reasonably expected for certain species that are already being impacted by motor vehicles (Yosemite lewisia, orange lupine, slender-stalked monkeyflower).

Additions to the NFTS

There are no proposed additions to the NFTS in Alternative 1.

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

There are no proposed changes to the NFTS in Alternative 1 and no change from current condition for TES plant species.

Cumulative Effects

Cumulative negative effects to SNF TES plants from Alternative 1 would be most likely under this alternative. Cumulative effects have been broken down by guilds to clarify the magnitude and specificity of those effects:

Riparian Guild

Cumulative effects from motor vehicle activity and other past, present and reasonably foreseeable actions to riparian species would likely be significant. Over time, assuming unauthorized motor vehicle activity stays at least the same level of use it does currently, indirect effects to streams, wet meadows, fens, seeps and springs would accumulate. Other forest activities that also impact riparian species include grazing and fuels treatments. Cattle grazing in meadows, fens and streamside areas can alter stream morphology and increase soil erosion. Planned fuels treatments often have streamside buffers but can still increase sediment deposition in particular watersheds. Existing parking and open areas along NFTS facilities can compact soils and possibly increase surface runoff into riparian zones. Hydrology of wet meadows and fens are particularly susceptible to perturbations and changes to water level, sediment input, pH or water temperature could alter these systems to a degree such that they no longer function as fens but rather as wet meadows (Cooper, Chimner and Wolf 2005); wet meadows could become dry meadows. Streambank species, such as Rawson's flaming trumpet, subalpine fireweed and veined water-lichen would be only slightly more robust to alterations in the physical environment. Veined

water-lichen would be the most susceptible, as its requirement for cold temperatures, laminar flow and clean granitic substrates can be easily altered with sediment input from erosion of unauthorized routes or pollution from vehicles. Rawson's flaming trumpet and subalpine fireweed are streambank dwellers within the high-flow reach of a channel and the most likely cumulative effects would be those intermittent disturbances that alter or remove these plants by traveling vehicles or equipment.

Rock Outcrop Guild

Rock outcrop species can be considered to be highly susceptible to unauthorized motor vehicle activity and therefore cumulative effects could be significant for this group of species. Although not many projects take place on rock outcrops, motor vehicle activity alone can be considered to be the main catalyst for cumulative effects for rock outcrop species. Any current or planned projects on the SNF that have rock outcrops within their project area have design measures built in that exclude equipment and vehicles, avoid piling materials on the outcrops and prevent spraying of any chemicals without further consultation with a SNF botanist. Over time, rock outcrop species populations, especially those of Mariposa pussypaws, Yosemite lewisia and slender-stemmed monkeyflower could suffer moderate to severe losses in habitat (clean granitic pans on outcrops) and species viability for the aforementioned species would decrease measurably. Mono Hot Springs evening primrose is more robust due to its extensive populations in wilderness areas and distributional range but it too could suffer some decline in population health. Carbonate/metamorphic outcrops on the SNF are located in hard to access areas but cumulative effects for this grouping of species could also be evident. A few species have extremely limited distribution in this grouping and these plants (Yosemite onion, Congdon's woolly sunflower and Congdon's lewisia) can be considered to be relatively sensitive to cumulative effects. Although the number of forest projects in the vicinity of these species (Merced River) are presently limited, the risk of landslides coupled with recreation activities and recent wildfires pose a threat when considered with unauthorized motor vehicle activity for these species. Erosion from unauthorized routes could possibly alter or cover plants and even occasional direct effects from tire trampling could occur to individuals over time. Population viability for these three species could be compromised and while not likely, extirpation of one or more of these species is a small but real consideration when considering cumulative effects. Cumulative negative effects to species in this guild are expected and over time, some specific TES plant population health may be greatly affected.

Chaparral Guild

Cumulative negative effects for chaparral species would occur but to what degree is harder to ascertain as some species are used to regular disturbance. Carpenteria could experience fragmentation of habitat over time and possibly accumulation of invasive nonnative grasses which might make seedling recruitment less likely. Parry's horkelia has a small distribution of occurrences that could be sensitive to motor vehicle activity over time, however with the recent expansion of population boundaries after fuels reduction, motor vehicle use is unlikely to bring about cumulative effects. Madera linanthus would most not be likely to experience cumulative effects due to its inaccessible locations and preference for moderately disturbed areas. Existing parking and open areas adjacent to chaparral areas can be vectors for noxious weeds, which can decrease potential habitat for chaparral species. Cumulative negative effects for the chaparral guild are expected to be relatively low in comparison to other guilds.

Forested Guild

The species in the forested habitat are more robust than other habitat groupings but some cumulative effects may occur under this alternative. Short-leaved hulsea is widespread enough, that cumulative effects are unlikely. Mountain lady's-slipper is probably more susceptible to motor vehicle use and this combined with ongoing and foreseeable timber projects in the Westfall analysis unit (Fish Camp Project, Sugar Pine Adaptive Management Project) makes cumulative effects for this species possible though not likely. Although protective design measures have been built in to these projects for mountain lady-slipper, the opening of the canopy and understory could increase access to occurrences of this plant by motor vehicles. Cumulative negative effects for these species are expected to be at a relatively low level but some periodic disturbance resulting from motor vehicle use or forest projects could have more impacts to the mountain lady-slipper population.

Other Habitat

Mariposa clarkia populations are hard to access by vehicle, thus direct effects are not generally expected, but with erosion, mass soil movement, wildfire and invasive plants continually threatening this species, low to moderate negative cumulative effects are possible under this alternative.

Alternative 2

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The direct effects of implementing a prohibition on cross-country motor vehicle travel on botanical resources are widespread and would generally be beneficial for almost all plants across all habitat types. Cessation of motor vehicle activity in most areas of the SNF would result in improved health of individual plants, which leads to generally improved reproductive ability. Populations at risk or previously impacted by motor vehicles would be able to recover. Recovery would be most beneficial in granitic and metamorphic/carbonate habitats, where ecological processes for recovery take longer and these areas have received a disproportionate amount of motor vehicle traffic. Riparian habitat plants would also benefit greatly, as certain hydrologic functions are needed for plant population stability. If those functions are not impacted by unauthorized motor vehicle activity, then the plants in those areas will have a higher probability of maintaining or even increasing population numbers. Some of those hydrologic functions include water table level, stream sedimentation, stream morphology, water pH and stream disturbance. TES plants in forested and chaparral habitats would also benefit, although the effect would not likely be as significant as it would be for the previously mentioned habitats as the habitats tend to be more dynamic and disturbance-prone.

Indirect effects of implementing the cross-country travel prohibition would be decreased habitat alteration across the spectrum of habitats, which would lead to improved or at least stable population health for TES and watch list plants. These alterations include canopy cover, substrate removal, erosion/deposition, water temperature, pollution (by oil, nitrates, ozone and /or heavy metals) and dust. Decreasing the activities responsible for those alterations leads to slight to significant beneficial effects for almost all TES and watch list plant species. Another indirect effect of cessation of cross-country travel is the reduced probability of spreading noxious weed propagules across the SNF by motor vehicles. This in turn leads to less competition for resources by native vegetation and improves ecosystem stability and health.

Additions to the NFTS

Alternative 2 proposes to add approximately 44 miles of existing, unauthorized routes to the NFTS as motorized trails and 5 miles as roads to the NFTS. There are a total of 6 acres of areas being proposed as well for this alternative. In comparison, Alternative 1 has 605,000 acres open to motorized cross-country travel (approximately 552 miles of unauthorized routes), Alternative 3 is adding 0 miles and 0 acres, Alternative 4 is adding 51 miles and 37 acres and Alternative 5 is proposing 85 miles and 105 acres. Table 3- 114, Table 3- 115, and Table 3- 116 list the proposed motorized trails, roads and areas that affect botanical resources in Alternative 2. These effects are described below by guild or habitat grouping.

ROAD AND TRAIL ADDITIONS, SNF TES AND WATCH LIST SPECIES

Riparian Guild

Rawson's flaming trumpet

One proposed trail will have direct or indirect effects on one population of Rawson's flaming trumpet. This trail includes JSM70 in the Gags analysis unit. Direct effects of tire trampling on Rawson's flaming trumpet plants would be likely although limited in scope as the population is spread along the riparian corridor both upstream and downstream from the route area. This impact, however, could fragment the population and reduce fecundity. Indirect effects of possible increased erosion, compaction of soil, pollutants, dispersal of noxious weed propagules and habitat alteration would negatively impact the population over time. It is hard to estimate the scale of impact for this particular population but it would be at least slightly negative and possibly moderately negative. If a stream crossing is installed as a design measure, it is suggested that a bridge be used as it will generate the least impact to Rawson's flaming trumpet (and veined water-lichen, also located on JSM70- see discussion below). Other crossing types such as culverts or low-water crossings are likely to generate negative short-term effects that could significantly impact Rawson's flaming trumpet and veined water-lichen. Consultation between a SNF hydrologist, road engineer and botanist should take place before mitigations begin to confirm whether this action is appropriate. Monitoring of Rawson's flaming trumpet occurrences and mitigations would be implemented when routes are brought on the MVUM; the interval and timing of which will be determined by SNF botanists.

Subalpine fireweed

Two proposed motorized trails will have direct or indirect effects on two populations of subalpine fireweed. These trails include KD-218 in Dinkey-Kings and PK-85 in Tamarack-Dinkey analysis units. Although the plant is adapted to moderately disturbed riparian habitat, it is unlikely that repeated trampling of the plant by motor vehicle tires would enhance its viability. By applying the prescriptive action to define the travelway (associated with resource issue code BO-3) there would be a reduction of inadvertent travel or parking over the subalpine fireweed populations, reducing the effects to low for both populations. This mitigation should have little impact to other resources as the work can be done by hand using local materials. The KD-218 population is small and located in mesic conditions adjacent to the roadside; while impacts may occur, it is already in an area that is marginal for its viability. As for the PK-85 population, it is slightly larger but conditions are similar in respects to exposure and hydrology. Because this plant is being found increasingly throughout the SNF, its ecology is being understood better and the current consensus on the SNF is that the metapopulation is robust and disturbance in some subpopulations is not likely to impact this plant in a significant way. Monitoring of subalpine fireweed occurrences and mitigations would occur at an interval to be determined by SNF botanists.

Veined water-lichen

Six proposed motorized trails will have direct or indirect effects on populations of veined water-lichen. These trails include JSM70 in Gaggs, JD2, ML403, PK24, PK25 and SR-112 in Westfall analysis units. Direct effects for this aquatic lichen would include stream crossings by vehicles, which occurs in every aforementioned route with the exception of PK25, which comes within 30 meters (98 feet) of the same stream that PK24 does. This would crush or remove plants located in the immediate vicinity of the crossing. Of more concern are the indirect effects of motor vehicle traffic in these streams which include increased sedimentation, pollution by oil and/or gas (along with exhaust) and alteration of streambed morphology. As veined water-lichen depends on clear and cold fresh water, alterations to these parameters have significant negative impact to the viability of the species (Davis 1999). Additionally, increased sedimentation would cover favorable substrate (clean granitic rocks) areas where veined water-lichen prefers to live, eradicating both existing plants and preventing the expansion of new plants. The scope of the impacts would be limited to areas downstream of such crossings but that is considerable for some stretches of streams. If a hardened stream crossing is installed, it is suggested that a bridge be used as it will generate the least impact to veined water-lichen. Other crossing types such as culverts or low-water crossings are likely to generate negative short-term effects that could significantly impact veined water-lichen. Consultation between a SNF hydrologist, road engineer and botanist would take place before mitigations begin to confirm whether this action is appropriate. Monitoring of veined water-lichen occurrences and mitigations would occur at an interval to be determined by the SNF botanists.

General meadow habitat effects

In Alternative 2 there would be 0 miles of proposed facilities within meadows and other riparian features. This compares to Alternative 1 with 4.65 miles of unauthorized routes, Alternatives 2 and 4 with 0 miles and Alternative 5 with 0.08 miles of proposed facilities within meadows and other riparian features.

Chaparral Guild

Carpenteria

Two proposed motorized trails will have direct or indirect effects on one population of carpenteria. These trails include JH1 and SR-3 in Jose-Chawanakee analysis unit. The population indicated is the largest population of carpenteria on the SNF. There are expected to be few direct impacts as the plant is a medium to large shrub but vehicular traffic can remove branches and stems. Indirect effects are more problematic; some of those effects are soil compaction, removal or alteration of existing shrubs to facilitate motor vehicle use, the spread of noxious weed propagules and/or wildfire resulting from contact with heated vehicle parts. Any maintenance activity that would be undertaken to bring these roads and motorized trails up to standard would first be reviewed by a SNF botanist to ensure carpenteria populations are not negatively affected. Monitoring of carpenteria occurrences and mitigations will occur over an interval to be determined by SNF botanists.

Negative indirect impacts are expected to be relatively low with mitigations although some of the indirect effects may pose slightly higher negative impacts.

Table 3- 114. Alternative 2 – Unauthorized Routes added as NFTS Motorized Trails with Resource Issues

Route	Affected Species	# of Occurrences	Analysis Unit	Resource Issue Code
JH1	CACA	1	Jose-Chawanakee	BO-4
SR-3	CACA	1	Jose-Chawanakee	BO-4
JD2	PEHY	1	Westfall	BO-7
JSM70	PEHY,CORA	PEHY-1, CORA-1	Gaggs	BO-7
ML-403	PEHY	1	Westfall	BO-7
PK24	PEHY	PEHY-1	Westfall	BO-7
PK25	PEHY	1	Westfall	BO-7
SR-112	PEHY	PEHY-1	Westfall	BO-7

Table 3- 115. Alternative 2 – Unauthorized Routes Added as NFTS Roads with Resource Issues

Route	Affected species	# of occurrences	Analysis Unit	Resource Issue Code
KD-218	EPHO	1	Dinkey-Kings	BO-3
PK-85	EPHO	1	Tamarack-Dinkey	BO-3

PROPOSED OPEN AREA ADDITIONS, SNF TES AND WATCH LIST SPECIES

Riparian Guild

Bolander’s clover

Proposed Open Area TULEMDW1 in Tamarack-Dinkey analysis unit will have indirect effects on one population of Bolander’s clover. In the current location (per GPS data) no direct effects are expected to occur, as the population exists outside the Open Area. However, because the Open Area boundary is within 200 ft of some portion of the population, indirect effects have the potential to occur. Those effects include run-off from the Open Area, fugitive dust and alteration of hydrology. While it is likely these indirect effects would be small, they still are possible and the impact would be negative to the population. The magnitude of the impact to this population of Bolander’s clover would most likely be small but population fecundity and health could be impacted, especially by altered hydrology, as this species is found in perennially wet meadows. No specific botanical mitigation measures were proposed but monitoring of this Open Area for potential indirect effects will occur on an annual basis for a period that will be at least 3 years, after which monitoring may switch to a biennial interval. Any indication that indirect effects are harming Bolander’s clover in this location would trigger an interdisciplinary review.

Table 3- 116. Alternative 2 – Areas with Resource Issues

Open Area	Acres	Affected Species	# of occurrences	Analysis Unit	
TULEMDW1	6.12	TRBO	1	Tamarack-Dinkey	Monitoring
Total acres with botanical resources known		Total acreage proposed		Proportion with botanical resources affected	
6.12		6.12		100 percent	

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

Note: Changes in vehicle class will not result in differing effects to TES plants (see assumptions in Section 3.11.1)

SEASON OF USE AND PROHIBITION OF NFTS USE

The following changes to Alternative 2 will have these expected effects to TES plant species: NFTS roads and motorized trails were reviewed by resource specialists. Relevant and current resource information was applied and in some cases resulted in proposed new seasons of use or year-round closures. Some seasonal or year-round closures were made for TES plants, reducing direct negative effects. Several NFTS roads that have botanical resources in the vicinity of the road are now proposed to be either closed year-round to the public or have a seasonal restriction. See Table 3- 117 for a listing of roads with known botanical issues. Road 09S310 (Kaweha Road) will be changed from closed year-round to seasonally closed. Some indirect negative impacts to carpenteria may occur but are expected to be very low as most effects have already occurred due to road construction and because the dispersed nature of the carpenteria population reduces the potential for extirpation of the entire population. In general, these closures will reduce negative direct and indirect effects (i.e. soil compaction and erosion) to TES plants when compared to their current status (Alternative 1).

Table 3- 117. Alternative 2 – Road Closures for Botanical Resource Issues

Road ID	Road Name	Analysis Unit	Status in Alternative 1	Alternative 2 Open: From-To	
07S031A	Daulton Station	Stump Springs-Big Creek	Open year-round	Apr. 20	Dec. 1
08S008AB	Agua B	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JB	RR Grade Line JB	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JC	RR Grade Line JC	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JCA	RR Grade Line JCA	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JCB	RR Grade Line JCB	Jose-Chawanakee	Open year-round	Closed year-round	
09S006EA	Rector Spur EA	Jose-Chawanakee	Open year-round	Closed year-round	
09S061B	Buster	Jose-Chawanakee	Open year-round	Closed year-round	
09S061C	Toad	Jose-Chawanakee	Open year-round	Closed year-round	
09S310	Kaweha	Jose-Chawanakee	Closed year-round	Apr. 20	Dec. 1
10S034	Garfield	Tamarack-Dinkey	Closed year-round	Closed year-round	
10S069*	Dinkey-Trimmer	Dinkey-Kings	Open year-round	May 20	Dec. 1
				Apr. 20	Dec. 1
11S040K	General Phil	Tamarack-Dinkey	Open year-round	Closed year-round	
11S061	Nutmeg Saddle	Dinkey-Kings	Closed year-round	Closed year-round	

*Two sections of the road have different closure periods- the longer restriction period is for MP 4.20 to 11.50; the second shorter period for 11.50 to 20. 80

Cumulative Effects

Cumulative impacts resulting from this alternative and past, present and reasonably foreseeable future actions on the SNF to TES plants are hard to gauge but they are most likely beneficial in comparison with Alternative 1 and moderately beneficial relative to Alternative 5. The amount of total motorized trails, roads and areas is smaller than in either Alternatives 1 or 5 and the effects to botanical resources is less altogether in Alternative 2 than either alternative. Negative cumulative impacts to TES plants are still feasible in this alternative; the spread of noxious weed seeds inadvertently by motor vehicles is a constant risk to rare plants and SNF ecosystems. Veined water-lichen is most likely to be susceptible to negative cumulative impacts that include grazing, fuels treatments, wildfire, and the proposed motorized facilities; all of veined water-lichen occurrences under this alternative are located in Westfall analysis unit. Jose-Chawanakee analysis unit will have some low cumulative effects for orange lupine and carpenteria. Most other analysis units have low cumulative effects or no cumulative effects to TES plants from this proposed alternative. In addition, Westfall and Jose-Chawanakee analysis units also have concurrent or reasonably expected fuels treatment projects which add to the level of cumulative negative impacts for these species. It is expected that TES plants overall will have moderately

beneficial cumulative effects resulting from this alternative as it will decrease the amount of available motorized trails and areas significantly from current levels of use.

Alternative 3

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Direct and indirect effects of the prohibition on cross-country travel are similar to those described in Alternative 2 with the exception that no facilities are proposed to be added to the NFTS under this alternative and that any positive effects from the prohibition of cross-country travel would be increased across the SNF. This would result in a slight to moderate beneficial effect for most TES plant species. No negative impacts are expected from this alternative to known populations of TES plants on the SNF.

Additions to the NFTS

There are no proposed additions to the NFTS in Alternative 3.

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

There are no proposed changes to the NFTS in Alternative 3 and no change from current condition for TES plant species.

Cumulative Effects

When combined with past, present and reasonably foreseeable future actions (including roadside hazard sales, existing open areas, grazing and prescribed burns), the cumulative effects of Alternative 3 for TES plants would be moderately to strongly beneficial for most TES plant species. Prohibiting cross-country travel would have similar effects to those described under Alternative 2.

Alternative 4

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Direct and indirect effects of the prohibition on cross-country travel are similar to those described in Alternative 2.

Additions to the NFTS

Alternative 4 has a total of 51 miles of motorized trails and roads and 37 acres of proposed areas to be brought in to the SNF transportation system. This is in comparison to 552 miles of unauthorized routes in Alternative 1, 44 miles of proposed motorized trails and 6 acres in Alternative 2 and 85 miles of motorized trails with 105 acres of areas in Alternative 5. Table 3-118, Table 3-119, and Table 3-120 display the motorized roads, trails and areas affecting botanical resources. These resources are discussed below by habitat grouping.

NFTS ROAD AND TRAIL ADDITIONS, SNF TES AND WATCH LIST SPECIES

Riparian Guild

Rawson's flaming trumpet

One proposed trail will have direct or indirect effects on one population of Rawson's flaming trumpet. This trail is JSM70 in Gaggs analysis unit. As this trail crosses a tributary to Browns Creek, it goes through a riparian area that contains Rawson's flaming trumpet along its banks. Expected direct effects would be crushing of plants by vehicle tires. Indirect effects would include alteration of riparian habitat, erosion of streambanks, compaction of soils and the inadvertent spread of noxious weed propagules into Rawson's flaming trumpet habitat. It is important that mitigation measures are implemented before this trail is brought into the SNF transportation system. If noxious weeds such as bull thistle or Himalayan blackberry were accidentally brought in, these could have a more significant impact on the population and on the riparian habitat. Mitigations for this route are discussed below in the veined water-lichen section. When mitigations are implemented, direct and indirect negative effects will be relatively low to Rawson's flaming trumpet. Monitoring periodicity would be similar to those suggested for Rawson's flaming trumpet in Alternative 2.

Veined water-lichen

One proposed trail will have direct or indirect effect on one population of veined water-lichen. This trail is JSM70 in Gaggs analysis unit. Direct effects to this species would be trampling by vehicle tires. Indirect effects include increased sediment load in the stream, oil, gas and nitrate pollution and alteration of stream morphology. If a hardened water-crossing is installed, it is suggested that a bridge be used as it will generate the least impact to veined water-lichen. Other crossing types such as culverts or low-water crossings are likely to generate negative short-term effects that could significantly impact veined water-lichen. Consultation between a SNF hydrologist, road engineer and botanist would take place before mitigations begin to confirm whether this action is appropriate and/or feasible. Monitoring of veined water-lichen occurrences and mitigations would occur at an interval to be determined by SNF botanists. Negative effects for veined water-lichen under this alternative are expected to be at a low level with a bridge crossing but higher levels of impact would be expected until there is a crossing established.

Fen habitat

One proposed trail will have direct or indirect effects on an identified fen in the Gaggs analysis unit. This has been addressed because while there are no known TES plants located in this fen, it is a specialized habitat that is extremely sensitive to environmental variations and is noted in the Sierra Nevada Forest Plan Amendment (USDA-FS 2004a) as a type of habitat to be protected (S&G #118). Fen ecology depends on the slow buildup of clonal mosses, sedges, reeds and other plants that can exist due to high water levels, pH, water temperature and macronutrients (Cooper, Chimner and Wolf 2005). Alterations to those functions can impair fen ecological processes. Due to the fen's location downhill from proposed trail JG5 in Gaggs analysis unit, it is at risk from indirect and cumulative effects resulting from trail use. Although it is located across a road (Road 07S034) from JG5, erosion and drainage from the trail threaten to have negative impacts on the fen habitat. Increased sediment input from proposed trail JG5 poses the risk of indirect effects. The mitigation measures for the fen habitat near JG5 will be verified after a site visit with appropriate specialists to determine what will be the most effective at reducing sediment deposition and erosion. The soil and watershed mitigation measures for this route (SW-1,2,5,9,16) will be monitored to determine effectiveness for protecting the fen habitat. Negative effects to this fen will be low with implemented mitigation measures but without implementation, negative indirect effects will be low to moderate.

General meadow habitat effects

In Alternative 4 there would be 0 miles of proposed facilities within meadows and other riparian features. This compares to Alternative 1 with 4.65 miles of unauthorized routes, Alternatives 2 and 3 with 0 miles and alternative 5 with 0.08 miles of proposed facilities within meadows and other riparian features.

Rock Outcrop Guild

Mono Hot Springs evening primrose

One proposed trail will have direct or indirect effects on one population of Mono Hot Springs evening primrose. This trail is PK-05x in East of Kaiser Pass analysis unit. Direct effects would be expected to have the most impact on this population but as the population is rather large in size, those negative impacts will likely be low with the possibility of a number of individual plants being crushed. Prescriptive actions associated with resource issue codes BO-1 and 3 would minimize negative effects by defining the trailway and keeping motor vehicle users off open granitic areas that form this plant's main habitat. Barriers should be made with locally obtained, ideally rock, from areas not containing Mono Hot Springs evening primrose and used in the most efficient way possible to prevent effects occurring to plants. Little negative effect to botanical, aquatic, cultural, hydrological or wildlife resources are expected as a result of using local rock for barriers but if heavy equipment is used, it should be washed before arriving on site to minimize the risk of spreading noxious weed propagules. Additionally, rocks must be obtained from a local source that has the least impact on soils, watershed, aquatics/terrestrial biology and vegetation. Monitoring of the occurrence and its mitigations are to be done at intervals determined by the SNF botanists. Overall negative effects are expected to be low with mitigations and low to moderate without implementation.

Forested Guild

Short-leaved hulsea

Two proposed motorized trails will have direct or indirect effects on one population of short-leaved hulsea. These trails include PK-65 and PK-66 in Tamarack-Dinkey. Direct effects on short-leaved hulsea would be crushing plants with vehicle tires. Indirect effects would include soil erosion, dispersal of noxious weed seeds and fugitive dust. During botanical surveys along this route for the Travel Management FEIS, a small number of short-leaved hulsea plants (approx. ten mature plants) were observed having some direct and indirect effects occurring to them. Proposed mitigation measures for the short-leaved hulsea population is to define the travelway near the population to direct traffic in that area and potentially altering the trail pathway if deemed feasible. Re-alignment of the trail within 50 ft (15m) will be done in a way to minimize potential for soil erosion, altered hydrology or alteration of surrounding vegetation. Work equipment will need to be washed before coming onsite to prevent the inadvertent dispersal of noxious weed propagules. Monitoring of the re-route and short-leaved hulsea occurrences are expected at least on a biennial basis for a period to be determined by SNF botanists. With application of these prescriptive actions associated with resource issue codes BO-2 and 3, negative effects would be low.

Table 3- 118. Alternative 4 – Unauthorized Routes Added as NFTS Motorized Trails with Resource Issues

Route	Affected Species	# of occurrences	Analysis Unit	Resource Issue Code
JG5	None, fen	Fen	Gaggs	SW-1; SW-2; SW-5; SW-9; SW-16; BO-6
PK-65	HUBR	1	Tamarack-Dinkey	BO-2; BO-3
PK-66	HUBR	1	Tamarack-Dinkey	BO-2; BO-3
JSM70	PEHY, CORA	PEHY-1, CORA-1	Gaggs	BO-7

Table 3- 119. Alternative 4 – Unauthorized Routes Added as NFTS Roads with Resource Issues

Route	Affected Species	# of Occurrences	Analysis Unit	Resource Issue Code
PK-05X	CASIA	CASIA	East of Kaiser Pass	BO-1; BO-3

PROPOSED OPEN AREA ADDITIONS, SNF TES AND WATCH LIST SPECIES

Riparian Guild

Bolander’s clover

The addition of 6.1 acres of proposed parking/staging area in Tamarack-Dinkey analysis unit will have the following direct and indirect effects on one population of Bolander’s clover:

Direct effects stemming from this proposed parking/staging area are similar to those detailed in Alternative 2 for the same area. There are no additional effects or impacts expected from this alternative.

Rock Outcrop Guild

Yosemite lewisia

The addition of 25.1 acres of proposed areas will have the following direct and indirect effects on two populations of Yosemite lewisia:

Westfall: Direct effects for this species would be crushing of plants from vehicle tires and the removal of suitable substrate from granitic pans by vehicles as well. Indirect effects would include alteration of hydrology and soil deposition that could alter the ‘clean’ granitic gravel that is preferred by this species (lacking organic matter). Pollution from oil, gas and heavy metals could also affect the population health over time. Application of prescriptive actions associated with resource issue codes BO-1 and BO-3, negative impacts are expected to be low to either population. The mitigation measures would be rock barriers (some may be wood depending on material availability) in areas to both protect granitic pans and to designate areas for motor vehicle travel on the rock outcrop. Annual monitoring of both populations would ensure the efficacy of these mitigations and adjustments could be made over time to further enhance protection of this species. Using local rock or wood from the surrounding area is not expected to have discernible negative impacts on natural resources. If equipment is used to carry or extract

rock, it should be washed before being brought on site to prevent accidental dispersal of noxious weed seeds.

Table 3- 120. Alternative 4 – Open Areas with Botanical Resource Issues

Open area	Acres	Affected Species	# of Occurrences	Analysis Unit	Resource Issue Code*
TULEMDW1	6.12	TRBO	1	Tamarack-Dinkey	Monitoring
VSTDM363	21.28	LEDI	1	Westfall	BO-1; BO-3
CHPOSDDL390	3.82	LEDI	1	Westfall	BO-1; BO-3
Total acres with botanical resources known		Total acreage proposed		Proportion with botanical resources affected	
31.22		37.13		84 percent	

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

Note: Changes in vehicle class will not result in differing effects to TES plants (see assumptions in Section 3.11.1).

SEASON OF USE (INCLUDES CLOSED YEAR-ROUND)

Changes to the season of use for roads and motorized trails under Alternative 4 are not expected to affect SNF TES species in a significant manner but will have some beneficial effects; effects will be similar to those of Alternative 2. Table 3- 121 shows road closures for botanical (and other) reasons. Most are similar to those in Alternative 2 but there are additional roads in this alternative as well as some changes to closure periods. These additions and changes in closure periods will benefit some TES plant populations as well as botanical areas and special interest areas. The only change in seasonal closure that will have potential for negative effects to TES plant species is the 09S310 road (Kaweha Road in Jose-Chawanakee) which will change from closed year-round to a seasonal closure. Some indirect negative impacts to carpenteria may occur but are expected to be very low, as most effects have already occurred due to road construction and also due to the dispersed nature of the carpenteria population. General beneficial effects to botanical resources are expected with the seasonal or year-round closure of NFTS roads and motorized trails under this alternative.

Table 3- 121. Alternative 4 – Road Closures for Botanical Resources

Road ID	Road Name	Analysis Unit	Alternative 1 Status	Alternative 4 Open: From-To	
07S031A	Daulton Station	Stump Springs-Big Creek	Open year-round	Apr. 20	Dec. 1
08S001A	John Boy	Stump Springs-Big Creek	Open year-round	Closed year-round	
08S008JB	RR Grade Line JB	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JC	RR Grade Line JC	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JCA	RR Grade Line JCA	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JCB	RR Grade Line JCB	Jose-Chawanakee	Open year-round	Closed year-round	
09S006EA	Rector Spur EA	Jose-Chawanakee	Open year-round	Closed year-round	
09S061B	Buster	Jose-Chawanakee	Open year-round	Closed year-round	
09S061C	Toad	Jose-Chawanakee	Open year-round	Closed year-round	
09S310	Kaweha	Jose-Chawanakee	Closed year-round	Apr. 20	Dec. 1
10S020B	Ahart Meadow Spur B	Tamarack-Dinke	Closed year-round	Closed year-round	
10S034	Garfield	Tamarack-Dinke	Closed year-round	Closed year-round	
10S043X	Blue Canyon OHV # 1	Dinke-Kings	Open year-round	Closed year-round	
10S073B	Straight Spur B	Tamarack-Dinke	Closed year-round	Closed year-round	
10S403	Blue Rock	Dinke-Kings	Open year-round	Closed year-round	
11S002F	Lower Rancheria	Dinke-Kings	Open year-round	Closed year-round	
11S039B	Roezli	Dinke-Kings	Open year-round	Closed year-round	
11S040K	General Phil	Tamarack-Dinke	Open year-round	Closed year-round	
11S061	Nutmeg Saddle	Dinke-Kings	Closed year-round	Closed year-round	

Cumulative Effects

Alternative 4 cumulative effects from motor vehicle travel and other past, present and foreseeable projects are expected to be moderately beneficial for most TES plants when compared to Alternatives 1 and 5. It is expected to be slightly beneficial or neutral when compared to Alternative 2; again, with the exception to those TES plants already discussed in this alternative. Cumulative effects to TES plants are expected to be relatively negative in comparison to

Alternative 3. For those plants affected by this alternative, Yosemite lewisia is likely to receive the most negative cumulative impact as the amount of acreage to be added has more effect due to the size of the proposed areas in comparison to other affected populations. Mitigations for Yosemite lewisia populations will decrease those impacts significantly but will not decrease them to a level of no effect. Other current and foreseeable projects are expected to have little or no impact to Yosemite lewisia, due to design measures built in for rock outcrop species. As for the other TES plants discussed under this alternative, overall negative cumulative effects are expected to be very low with mitigations in place. Expected projects from past, present and foreseeable future activities that would impact these species include cattle grazing, fuels treatments, hazard tree removal, and motorized special-use events. The impacted fen habitat is expected to have moderate negative cumulative effects if mitigations are not put in; after mitigations are put in, those effects are expected to be low.

Alternative 5

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Direct and indirect effects of the prohibition on cross-country travel are similar to those described in Alternative 2. Those additions will be described below.

Additions to the NFTS

Alternative 5 is proposing approximately 85 miles of motorized trails and roads to be added to the SNFTS. There are a total of 105 acres being proposed for this alternative. In comparison, Alternative 1 has 552 miles of unauthorized routes, Alternative 2 is proposing 44 miles and 6 acres, Alternative 3 is adding 0 miles and 0 acres and Alternative 4 is adding 51 miles and 37 acres. Table 3- 122, Table 3- 123, and Table 3- 124 list the proposed motorized trails, roads and areas that affect botanical resources in Alternative 5. These effects are described below by habitat.

ROAD AND TRAIL ADDITIONS, SNF TES AND WATCH LIST SPECIES

Riparian Guild

Rawson's flaming trumpet

Two proposed motorized trails will have direct or indirect effects on two populations of Rawson's flaming trumpet. These trails include PK47 in Westfall and JSM70 in Gags analysis units. Direct effects include trampling of mature plants by vehicle tires. Increased erosion of streambanks, compacted soils/altered hydrology and the dispersal of noxious weed seeds are the most likely negative indirect effects.

Gags: JSM70 is a stream crossing route that has been discussed in Alternatives 2 and 4; please refer to those alternatives for effects analyses and mitigations. Alternative 5 does not change or alter those determinations made in those alternatives.

Westfall: PK47 does not cross the perennial stream where Rawson's flaming trumpet is located (North Fork Willow Creek) but it still comes within 5 meters (16 feet) of the water's edge. Direct effects for the PK47 route are likely to be low as plants were not found within the immediate area 49 feet (15 m) around the route. However, some plants were located downstream of the route (within 164 feet (50 m)) that can be affected by indirect effects, especially erosion and noxious

weed establishment. Application of prescriptive actions associated with resource issue code BO-1 would reduce the threat of indirect effects to an acceptably low factor. Actions include blocking downstream access to vehicle with an appropriate barrier made with local materials. Using local rock (or wood) material is not expected to have negative impacts on soils, cultural, watershed or aquatic/terrestrial wildlife; however, appropriate resource specialists will be contacted before barriers are installed. Monitoring schedule would be similar to that suggested for Rawson's flaming trumpet in Alternatives 2 and 4.

Veined water-lichen

Four proposed motorized trails will have direct or indirect effects on four populations of veined water-lichen. These trails include BP21 and JSM70 in Gags analysis unit as well as JD2, PK24, SR-112 and SR-119 in Westfall analysis unit. Overall negative effects for veined water-lichen in this alternative are expected to be relatively low with bridge crossings implemented but indirect effects may be at a moderate level until implementation is completed.

Gags: JSM70 has been discussed for veined water-lichen in Alternatives 2 and 4 and there is no change for that analysis under this alternative.

Westfall: JD2, PK24, and SR-112 have been analyzed in Alternative 2 for veined water-lichen and there are no significant changes expected under this alternative for direct and indirect effects. Mitigations as discussed above will be the same for these populations as well. SR-119 effects are similar to those for SR-112 and the proposed mitigations are the same (bridge recommended for a hardened water crossing).

Fen habitat

One proposed trail will have direct or indirect effects on an identified fen in the Gags analysis unit. This trail is JG 5; this habitat was analyzed in Alternative 4 and there are no changes expected under this alternative.

General Meadow Habitat Effects

In Alternative 5 there would be 0.08 miles of proposed facilities within meadows and other riparian features. This compares to Alternative 1 with 4.65 miles of unauthorized routes, Alternatives 2, 3 and 4 with 0 miles of proposed facilities within meadows and other riparian features.

Rock Outcrop Guild

Orange lupine

Two proposed motorized trails will have direct or indirect effects on two populations of orange lupine. These trails include ES10 and SR-36 in Jose-Chawanakee analysis unit. Direct effects for orange lupine are crushing of plants by tires and removal of granitic gravel from pans by vehicles. Indirect effects are alteration of hydrology and/or soil (gravel) deposition on rock outcrops. ES10 has a population near the beginning of the trail. SR-36 has a population at the top of the trail and is bisected by it. Application of prescriptive actions associated with resource issue codes BO-1 and BO-3 for SR-36 include defining the travelway (with rocks or other markers) to emphasize where the trail is located. ES10 would have a barrier put in place to prevent vehicles from staging or turning out into the population. With these mitigation measures in place, negative effects are expected to be low; monitoring of mitigations will occur to ensure efficacy (at least annually for the first 2 years). Material for barriers should be rock large enough to prevent accidental intrusion by motor vehicles. It is expected that using rock should not impact natural resources in any measurable negative way.

Mono Hot Springs evening primrose

One proposed trail will have direct or indirect effects on one population of Mono Hot Springs evening primrose. This trail is PK-05x in East of Kaiser Pass analysis unit. Direct effects include crushing of plants by vehicle tires and removal of substrate from granitic pans. Indirect effects from motor vehicle use would be alteration of soil pan deposition and hydrology, oil, gas, nitrate and heavy metal pollution from vehicles. With prescriptive actions associated with resource issue code BO-1 applied (barriers and/or a defined travelway), negative effects to the population would be reduced to a low level. Materials for the barriers (rock) and trailways are expected to be from local sources and the work for implementing them will not have any significant negative effects on known resources. If local sources cannot be used without resource damage, then clean granitic rock from a SNF site shall be used. Equipment used for barrier construction or implementation should be washed before being brought on site to prevent the inadvertent spread of noxious weed propagules. Monitoring will be similar to that proposed in Alternative 4 for Mono Hot Springs evening primrose.

Chaparral Guild

Carpenteria

Two proposed motorized trails will have direct or indirect effects on one population of carpenteria. These trails are JH1 and SR-3 in Jose-Chawanakee analysis unit. As JH-1 was analyzed for this species under Alternative 2, the determination remains the same as no additional factors are expected to affect this species under this alternative. SR-3 also has scattered populations of carpenteria either along or near the trail. Similar mitigation measures would be applied for SR-3 as were proposed for JH1, this should bring any negative effects to carpenteria to a minimal level.

Forested Guild

Short-leaved hulsea

Two proposed motorized trails will have direct or indirect effects on one population of short-leaved hulsea. These trails include PK-65 and PK-66 in Tamarack-Dinkey analysis unit. These trails have been analyzed under Alternative 4 and the determination is the same for this alternative as well. Mitigations recommended are also the same as Alternative 4.

WATCH LIST PLANTS

Aromatic canyon gooseberry - *Ribes menziesii* var. *ixoderme* (RIMEI)

Two proposed motorized trails will have direct and indirect effects on one population of aromatic canyon gooseberry. These trails are ZZ25 and ZZ26 in Dinkey-Kings analysis unit. Direct effects include damage to the plant by removal of plant parts or in some cases, removal of the whole plant. Indirect effects would include the accidental dispersal of noxious weed propagules by motor vehicles, soil erosion and soil compaction. This population of aromatic canyon gooseberry is spread between at least two occurrences in the immediate vicinity of the trail (less than 49 feet (15 m)) and another occurrence south of the trail off the main thoroughfare (greater than 328 feet (100 m)). Direct effects are expected to have some small negative impact but indirect effects will likely have the most negative impact. The potential to spread noxious weeds is particularly high in this area as there are at least four noxious weed species within a mile of the population (Italian thistle, tocalote, bull thistle and cheatgrass). These effects will be minimized with a minor alteration of the trail (within 49 feet (15 m)) to avoid the noxious weed populations (prescriptive action associated with resource issue code BO-2). Any equipment working to alter the trail will follow SNFPA ROD (USDA-FS 2004a) standards and Forest Service Manual direction

concerning noxious weeds by cleaning equipment before and after leaving the work area. Alteration of the trail would also minimize soil erosion and removal of vegetation. Negative effects would then be relatively low. Monitoring of the occurrences and mitigations would be annually for at least 2 years, subsequent monitoring would be at an interval to be determined by SNF botanists.

Table 3- 122. Alternative 5 – Unauthorized Routes Added as NFTS Motorized Trails

Route	Affected Species	# of Occurrences	Analysis Unit	Resource Issue Code
BP21	PEHY	2	Gaggs	BO-7
JD2	PEHY	1	Westfall	BO-7
JG5	fen	1	Gaggs	BO-6
JH1	CACA	1	Jose-Chawanakee	BO-4
JSM70	CORA;PEHY	CORA-1; PEHY-1	Gaggs	BO-7
PK24	PEHY	1	Westfall	BO-7
PK47	CORA	1	Westfall	BO-1
PK-65	HUBR	1	Tamarack-Dinkey	BO-2; BO-3
PK-66	HUBR	1	Tamarack-Dinkey	BO-2; BO-3
SR-112	PEHY	1	Westfall	BO-7
SR-119	PEHY	1	Westfall	BO-7
SR-3	CACA	1	Jose-Chawanakee	BO-4
ZZ25	RIME	2	Dinkey-Kings	BO-2
ZZ26	RIME	2	Dinkey-Kings	BO-2

Table 3- 123. Alternative 5 – Unauthorized Routes added as NFTS Roads

Route	Affected Species	# of Occurrences	Analysis Unit	Resource Issue Code
ES10	LUCIC	1	Jose-Chawanakee	BO-1;
PK-05X	CASIA	1	East of Kaiser Pass	BO-1; BO-3
SR-36	LUCIC, MIGR	1	Jose-Chawanakee	BO-1; BO-3

PROPOSED OPEN AREA ADDITIONS, SNF TES AND WATCH LIST SPECIES

Chaparral Guild

Carpenteria

The addition of 0.66 acres of proposed areas will have the following direct and indirect effects on one population of carpenteria:

Jose-Chawanakee: Direct effects are loss of individual plants from tire trampling. Indirect effects from noxious weed dispersal and soil compaction may affect some plants but these effects are expected to be low for the population due to two factors- One factor is the population size (same population affected by JH1 and SR-3 in Alternative 2) and the other is the dispersed nature of carpenteria throughout the basin. Plants in the Jose Basin area are found as individuals or small groups clumped together but never in large occurrences. This makes the likelihood of negative effects from this Open Area to this plant low as only a few plants may be affected by this Open Area.

Yosemite lewisia

The addition of 25.1 (93.9) acres of proposed areas will have the following direct and indirect effects on two (four) populations of Yosemite lewisia:

Westfall: The two known populations in Westfall analysis unit are moderate to large populations of Yosemite lewisia. Direct effects from tire trampling and removal of granitic gravel from pans on the outcrop pose the biggest threat. Indirect effects from alteration of soil deposition and hydrologic flow are possible but have less impact to the population health. Application of prescriptive actions associated with resource issue codes BO-1 and BO-3 (establish barriers around known areas of plants and plant habitat [barriers would be local rock or wood] and in some areas, defining the travelway) would keep vehicle traffic away from sensitive areas. These mitigation measures, along with subsequent annual monitoring for at least 2 years afterwards, would lower the probability of negative effects to a low level.

Gaggs: These two areas are likely to have undiscovered populations of Yosemite lewisia or Kellogg's lewisia. Due to the early blooming period of both species (March-May), confirmation of presence was not affirmed. The prescriptive action associated with resource issue code BO-5 for both areas is to conduct surveys in spring of 2010 to confirm presence of either species. If presence is confirmed, then subsequent mitigations consisting of barriers to protect plants and defined travelways in sensitive areas will be installed, with subsequent monitoring to determine efficacy. If there are no plants found during botanical surveys, then the Open Area is likely to have no negative effect for any TES plant species.

Kellogg's lewisia

The addition of (68.8) acres of proposed Open Areas will have the following direct and indirect effects on potentially two populations of Kellogg's lewisia:

See the discussion above under Yosemite lewisia in Gaggs analysis unit for this species. Presence has not been confirmed in these two open areas. If presence is confirmed after surveying, then appropriate mitigation measures would be applied to reduce direct and indirect effects to the populations. If there are no plants found during botanical surveys, then the Open Area is likely to have no negative effect for any TES plant species.

Orange lupine

The addition of 0.66 acres of proposed Open Areas will have the following direct and indirect effects on one population of orange lupine:

Jose-Chawanakee: This Open Area also contains the carpenteria population discussed above. Orange lupine effects from motor vehicles would be trampling from tires as well as the removal of granitic gravel from shallow pans on granite outcrops. Indirect effects from alteration of soil deposition, soil erosion or noxious weed dispersal could also occur. Direct effects would likely be low as the population exists just on the periphery of the Open Area but indirect effects may have more impact to the population over time. Deposition of organic matter from vehicle onto granitic gravel may pose the largest threat over time. Mitigation for this Open Area would be the annual monitoring of the site for observed effects to orange lupine and if negative effects occur, the Open Area would be removed from the Motor Vehicle Use Map (MVUM) until appropriate mitigations are installed, which include (but are not limited to) barriers, designated trailways or decreasing Open Area size in the most sensitive area.

Table 3- 124. Alternative 5 – Open Areas

Area	Acres	Affected Species	Analysis Unit	Resource Issue Code
SGRLFHL223	0.66	CACA, LUCIC	Jose-Chawanakee	BO-3; BO-4
CNTRLCMPSPR345	4.0	LEDI or LEKE	Gaggs	BO-5
VSTDM363	21.28	LEDI	Westfall	BO-1; BO-3
CHPOSDDL390	3.82	LEDI	Westfall	BO-1; BO-3
RCKCRKSPR391	64.8	LEDI or LEKE	Gaggs	BO-5
Total acres with botanical resources known		Total acreage proposed	Proportion with botanical resources affected	
94.56		105.00	90 percent	

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

Note: Changes in vehicle class will not result in differing effects to TES plants (see assumptions in Section 3.11.1)

SEASON OF USE AND PROHIBITION OF NFTS USE

Changes to the season of use for roads and motorized trails under Alternative 5 are not expected to affect SNF TES species in a significant manner. Effects will be similar to those of Alternative 2 with the exception that 91 miles of roads and motorized trails and 113 acres of areas will be added under this alternative. Table 3- 125 shows road closures for botanical (and other) reasons. Again, this list is similar to that in Alternative 4 with one additional road and some changes to closure periods. The direct and indirect effects of these road closures will be small but positive for TES species as a whole. Botanical areas and special interest areas also benefit from these closure periods; most are year-round maintenance level one (ML 1) closures that will emphasize protection of resources in those areas. One exception is Straight Spur B in Tamarack-Dinkey analysis unit where a current year-round closure would change to an August 1 to December 1 closure. This is not expected to have much negative effect on the botanical resource located near this road as the closure period will cover most of the plants important life stages but does not offer the beneficial effects of a year-round closure.

Table 3- 125. Alternative 5 – Road Closures for Botanical Resources

Road ID	Road Name	Analysis unit	Alternative 1 Status	Alternative 5 Open: From-To	
07S031A	Daulton Station	Stump Springs-Big Creek	Open year-round	Closed year-round	
08S001A	John Boy	Stump Springs-Big Creek	Open year-round	Closed year-round	
08S008JB	RR Grade Line JB	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JC	RR Grade Line JC	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JCA	RR Grade Line JCA	Jose-Chawanakee	Open year-round	Closed year-round	
08S008JCB	RR Grade Line JCB	Jose-Chawanakee	Open year-round	Closed year-round	
09S006EA	Rector Spur EA	Jose-Chawanakee	Open year-round	Closed year-round	
09S008A	Sugarloaf Spur A	Jose-Chawanakee	Open year-round	Closed year-round	
09S061B	Buster	Jose-Chawanakee	Open year-round	Closed year-round	
09S061C	Toad	Jose-Chawanakee	Open year-round	Closed year-round	
09S310	Kaweha	Jose-Chawanakee	Closed year-round	Closed year-round	
10S034	Garfield	Tamarack-Dinkey	Closed year-round	Closed year-round	
10S043X	Blue Canyon OHV # 1	Dinkey-Kings	Open year-round	Closed year-round	
10S073B	Straight Spur B	Tamarack-Dinkey	Closed year-round	Aug. 1	Dec. 1
10S403	Blue Rock	Dinkey-Kings	Open year-round	Closed year-round	
11S002F	Lower Rancheria	Dinkey-Kings	Open year-round	Closed year-round	
11S040K	General Phil	Tamarack-Dinkey	Open year-round	Closed year-round	
11S039B	Roekli	Dinkey-Kings	Open year-round	Closed year-round	
11S061	Nutmeg Saddle	Dinkey-Kings	Closed year-round	Closed year-round	

Cumulative Effects

Cumulative effects to TES plants under Alternative 5 and other past, present and reasonably foreseeable future projects are expected to be low to moderate (negative) for those species analyzed in this alternative when compared to Alternatives 2, 3 and 4. In comparison to Alternative 1, however, effects for TES species will be moderately beneficial with exceptions for some species. For the most potentially negative effects, veined water-lichen may bear the most impact when proposed motorized trails in this alternative are considered with the cumulative

effects of all other Forest projects as the species is fairly susceptible to changes in stream functioning. Other projects that would contribute impacts would be fuels treatment, grazing, and thinning projects. Five occurrences would be affected in this alternative; along with the remaining population across the SNF this poses a moderate to moderately high negative risk to veined water-lichen over time without mitigations proposed for the species put in place. While this cumulative impact is not expected to be as great as it would be under Alternative 1 and about equivalent to those in Alternative 2, it still can be considered a significant impact to the species. Even with ideal mitigations in place (bridge crossings, as discussed in Alternatives 2, 4 and 5), these cumulative effects would lessen to a lower but still negative level.

Yosemite lewisia also stands to receive a portion of negative cumulative effects under this alternative. The populations in the proposed open areas are large and represent a significant fraction of the Bass Lake RD Yosemite lewisia distribution. Even with mitigations in place, these populations will likely receive low level cumulative effects as it will be hard to mitigate for the indirect effects of altered gravel deposition and hydrologic functioning. Kellogg's lewisia may also receive negative cumulative effects if confirmed in proposed Open Areas. These effects would be lessened with mitigation but the size of the areas combined with the relative rarity of the species on the SNF increases the magnitude of effects for this species.

Other species discussed under this alternative would have some negative cumulative effects when all applicable forest projects are considered. Many of the remaining species are found in riparian, rock outcrops or chaparral guilds. Mitigations for these species would reduce the cumulative impacts for these species but negative effects may still occur despite that. Rock outcrop species may be the most vulnerable due to the relative accessibility of the habitat in the proposed Open Areas (mostly flat granite outcrops). Riparian areas are usually designated exclusion zones from most equipment or project activities, but are still vulnerable to cumulative effects resulting from fuels projects, wildfire and grazing. Chaparral habitat may be the most resilient and the species within that habitat (*carpenteria*, *Ribes menziesii* var. *ixoderme*) are medium to large-sized shrubs that are more likely to be resistant to damage from motor vehicles but effects from noxious weeds and large, intense wildfires still pose a threat to these species health and ecology.

Summary of Effects Analysis across All Alternatives

Alternative 3 has the least relative impact to botanical resources overall while Alternative 1 has the most relative impact. Alternative 4 has the least impact of the action alternatives while Alternative 5 has the most impact; one category where Alternative 4 ranks slightly worse than Alternative 2 is 'Acres of areas open for public motor vehicle use.' In that instance, Alternative 2 would be better for TES plants near proposed Open Areas. Alternative 2 has moderate relative impact in comparison to the other action alternatives.

All action alternatives are considered better for TES plant species than Alternative 1 due to the allowance of continued motor vehicle use in Alternative 1. Because the area of effect is much larger, the impact to TES occurrences both known and unknown will be undoubtedly greater, thereby causing the most direct and indirect effects to plant species overall.

Summary of Effects Determinations for TES species

Threatened Species

Alternative 1

It is my determination that the Travel Management project may affect but is not likely to adversely affect *Calyptridium pulchellum* as allowing unauthorized motor vehicle activity to

continue and perpetuate poses the threat of negative indirect effects to the two known populations on the SNF.

Alternatives 2, 3, 4 and 5

It is my determination that the Travel Management project will not affect *Calyptridium pulchellum* because of the design measures proposed by U.S. Fish and Wildlife Service (USDI FWS 2006) that the SNF will follow to avoid damaging this plant species. These design measures apply only to facilities proposed to be added, not to NFTS facilities. The design measure reads:

- Proposed facilities are not within 500 feet of known habitat for *Mariposa pussypaws*

Another portion of the design measures includes a closure period for NFTS facilities during flowering season (March-June) in suitable habitat areas determined by SNF botanists. Proposed facilities in all alternatives (except Alternative 1) in the suitable habitat area (Jose Basin) have wet-weather and aquatic wildlife species closures.

Endangered Species

Alternative 1

It is my determination that Alternative 1 of the Travel Management project may affect but is not likely to adversely affect *Sidalcea keckii* or its designated critical habitat as continued use and growth of unauthorized motor vehicle routes could impact areas of suitable habitat (serpentine-derived clay soils) on the SNF.

Alternatives 2, 3, 4 and 5

It is my determination that Alternative 2 of the Travel Management project will not affect *Sidalcea keckii* or its designated critical habitat because there has been to date no record of this plant found on the SNF and suitable habitat for this species is limited to a small, inaccessible area on the southwestern portion of NFS lands.

Forest Service Sensitive Species

Alternative 1

It is my determination that the Travel Management project will not affect *Clarkia lingulata*, *Delphinium inopinum*, *Draba sharsmithii*, *Eriogonum nudum* var. *regerivum*, *Heterotheca monarchensis*, *Lupinus gracilentus*, *Lupinus lepidus* var. *culbertsonii*, *Petrophyton caespitosum* ssp. *acuminatum*, *Streptanthus fenestratus* or *Viola pinetorum* ssp. *grisea* because no populations or suitable habitat are known for these species within the project area.

It is my determination that the Travel Management project may affect individuals but is likely not to cause a trend to Federal listing or a loss of viability to *Allium yosemitense*, *Botrychium species* (*B. ascendens*, *B. lineare*, *B. lunaria*, *B. manganese*, *B. montanum*), *Bruchia bolanderi*, *Camissonia sierrae* ssp. *alticola*, *Carlquista muirii*, *Carpenteria californica*, *Clarkia biloba* ssp. *australis*, *Collomia rawsoniana*, *Cypripedium montanum*, *Dicentra nevadensis*, *Epilobium howellii*, *Erigeron aequifolius*, *Eriophyllum congdonii*, *Erythronium pluriflorum*, *Fissidens aphelotaxifolius*, *Horkelia parryi*, *Hulsea brevifolia*, *Leptosiphon serrulatus*, *Lewisia congdonii*, *Lewisia disepala*, *Lewisia kelloggii* ssp. *kelloggii*, *Lupinus citrinus* var. *citrinus*, *Meesia triquetra*, *Meesia uliginosa*, *Mielichhoferia elongata*, *Mimulus filicaulis*, *Mimulus gracilipes*, *Mimulus pulchellus*, *Peltigera hydrthyria* and *Trifolium bolanderi* because populations and suitable habitat

for these species will be affected although the threat to viability to almost all species can be considered low.

Alternative 2

It is my determination that the Travel Management project will not affect *Clarkia lingulata*, *Delphinium inopinum*, *Draba sharsmithii*, *Eriogonum nudum* var. *regerivum*, *Heterotheca monarchensis*, *Lupinus gracilentus*, *Lupinus lepidus* var. *culbertsonii*, *Petrophyton caespitosum* ssp. *acuminatum*, *Streptanthus fenestratus* or *Viola pinetorum* ssp. *grisea* because no populations or suitable habitat are known for these species within the project area.

It is my determination that the Travel Management project will not affect *Allium yosemitense*, *Botrychium* species (*B. ascendens*, *B. lineare*, *B. lunaria*, *B. manganese*, *B. montanum*), *Bruchia bolanderi*, *Camissonia sierrae* ssp. *alticola*, *Carlquista muirii*, *Clarkia biloba* ssp. *australis*, *Cypripedium montanum*, *Dicentra nevadensis*, *Erigeron aequifolius*, *Eriophyllum congdonii*, *Erythronium pluriflorum*, *Fissidens aphelotaxifolius*, *Horkelia parryi*, *Hulsea brevifolia*, *Leptosiphon serrulatus*, *Lewisia congdonii*, *Lewisia disepala*, *Lewisia kelloggii* ssp. *kelloggii*, *Meesia triquetra*, *Meesia uliginosa*, *Mielichhoferia elongata*, *Mimulus filicaulis*, *Mimulus gracilipes* and *Mimulus pulchellus* because proposed motorized trails, roads and areas will not impact these species due to their location.

It is my determination that the Travel Management project may affect individuals but is likely not to cause a trend to Federal listing or a loss of viability to *Carpenteria californica*, *Collomia rawsoniana*, *Epilobium howellii*, *Lupinus citrinus* ssp. *citrinus*, *Peltigera hydrothyria* and *Trifolium bolanderi* because these populations will receive some direct and/or indirect impacts but species viability is not threatened.

P. hydrothyria (veined water-lichen) will receive the most relative negative impact with six occurrences being affected. Other affected species in this alternative will have low negative impacts resulting from the implementation of this alternative.

Alternative 3

It is my determination that the Travel Management project will not affect *Allium yosemitense*, *Botrychium* species (*B. ascendens*, *B. lineare*, *B. lunaria*, *B. manganese*, *B. montanum*), *Bruchia bolanderi*, *Carlquista muirii*, *Carpenteria californica*, *Clarkia biloba* ssp. *australis*, *Clarkia lingulata*, *Collomia rawsoniana*, *Cypripedium montanum*, *Delphinium inopinum*, *Dicentra nevadensis*, *Erigeron aequifolius*, *Eriogonum nudum* var. *regerivum*, *Eriophyllum congdonii*, *Fissidens aphelotaxifolius*, *Horkelia parryi*, *Leptosiphon serrulatus*, *Lewisia congdonii*, *Lewisia disepala*, *Lewisia kelloggii* ssp. *kelloggii*, *Lupinus citrinus* var. *citrinus*, *Lupinus gracilentus*, *Lupinus lepidus* var. *culbertsonii*, *Meesia triquetra*, *Meesia uliginosa*, *Mielichhoferia elongata*, *Mimulus filicaulis*, *Mimulus gracilipes*, *Mimulus pulchellus*, *Peltigera hydrothyria*, *Petrophyton caespitosum* ssp. *acuminatum*, *Streptanthus fenestratus*, *Trifolium bolanderi* and *Viola pinetorum* ssp. *grisea* because proposed motorized trails, roads and areas will not impact these species due to their location.

It is my determination that the Travel Management project may affect individuals but is likely not to cause a trend to Federal listing or a loss of viability to *Camissonia sierrae* ssp. *alticola*, *Epilobium howellii*, *Erythronium pluriflorum* and *Hulsea brevifolia* because these species are located near NFTS facilities but viability is not threatened for the species.

Alternative 4

It is my determination that the Travel Management project will not affect *Allium yosemitense*, *Botrychium* species (*B. ascendens*, *B. lineare*, *B. lunaria*, *B. manganese*, *B. montanum*), *Bruchia bolanderi*, *Carlquistia muirii*, *Clarkia biloba* ssp. *australis*, *Clarkia lingulata*, *Cypripedium montanum*, *Delphinium inopinum*, *Dicentra nevadensis*, *Erigeron aequifolius*, *Eriophyllum congdonii*, *Erythronium pluriflorum*, *Fissidens aphelotaxifolius*, *Horkelia parryi*, *Leptosiphon serrulatus*, *Lewisia congdonii*, *Lewisia kelloggii* ssp. *kelloggii*, *Lupinus gracilentus*, *Lupinus lepidus* var. *culbertsonii*, *Meesia triquetra*, *Meesia uliginosa*, *Mielichhoferia elongata*, *Mimulus filicaulis*, *Mimulus gracilipes*, *Mimulus pulchellus*, *Petrophyton caespitosum* ssp. *acuminatum*, *Streptanthus fenestratus* and *Viola pinetorum* ssp. *grisea* because proposed motorized trails, roads and areas will not impact these species as the proposed facilities are not located near known occurrences or habitat of these species.

It is my determination that the Travel Management project may affect individuals but is likely not to cause a trend to Federal listing or a loss of viability to *Camissonia sierrae* ssp. *alticola*, *Collomia rawsoniana*, *Hulsea brevifolia*, *Lewisia disepala*, *Peltigera hydrothyria* and *Trifolium bolanderi* because the magnitude and scale of negative effects to species populations are relatively low in this alternative.

Lewisia disepala (Yosemite lewisia) will stand to receive the most negative impact from Alternative 4 if implemented as the amount of area affected is significant (two populations at 25.1 acres total). However, these impacts will likely be indirect effects and minor (possible altered hydrology) due to the mitigations recommended for those Open Areas.

Alternative 5

It is my determination that the Travel Management project will not affect *Allium yosemitense*, *Botrychium* species (*B. ascendens*, *B. lineare*, *B. lunaria*, *B. manganese*, *B. montanum*), *Bruchia bolanderi*, *Carlquistia muirii*, *Clarkia biloba* ssp. *australis*, *Clarkia lingulata*, *Cypripedium montanum*, *Delphinium inopinum*, *Dicentra nevadensis*, *Draba sharsmithii*, *Epilobium howellii*, *Erigeron aequifolius*, *Eriogonum nudum* var. *regerivum*, *Eriophyllum congdonii*, *Erythronium pluriflorum*, *Fissidens aphelotaxifolius*, *Heterotheca monarchensis*, *Horkelia parryi*, *Leptosiphon serrulatus*, *Lewisia congdonii*, *Lewisia kelloggii* ssp. *kelloggii*, *Lupinus gracilentus*, *Lupinus lepidus* var. *culbertsonii*, *Meesia triquetra*, *Meesia uliginosa*, *Mielichhoferia elongata*, *Mimulus filicaulis*, *Mimulus gracilipes*, *Mimulus pulchellus*, *Petrophyton caespitosum* ssp. *acuminatum*, *Streptanthus fenestratus*, *Trifolium bolanderi* and *Viola pinetorum* ssp. *grisea* because proposed motorized trails, roads and areas will not impact these species as the proposed facilities are not located near known occurrences or habitat of these species.

It is my determination that the Travel Management project may affect individuals but is likely not to cause a trend to Federal listing or a loss of viability to *Camissonia sierrae* ssp. *alticola*, *Carpenteria californica*, *Collomia rawsoniana*, *Hulsea brevifolia*, *Lewisia disepala*, *Lupinus citrinus* ssp. *citrinus*, and *Peltigera hydrothyria* because the magnitude and scale of negative effects to species populations are relatively low.

Veined water-lichen and Yosemite lewisia will receive the most relative negative impacts in this alternative but with mitigations implemented, even these effects should be confined to minor indirect effects. Kellogg's lewisia, if presence is confirmed in two areas, may also incur some negative impacts from proposed facilities due to the relative size of the potential habitat areas but similar mitigations as those suggested for Yosemite lewisia would be implemented and those effects would be limited to some indirect impacts.

Compliance with the LRMP and Other Direction

Alternative 1

Complies with LRMP and Forest Service direction regarding TES plants?

No. Alternative 1 violates the Sierra Nevada Forest Plan Amendment concerning Bog and Fen Habitat (SNFPA ROD page 65, S&G #118, USDA-FS 2004a) and LRMP direction for sensitive plant species to: 'manage sensitive plant species to avoid future listing as threatened and endangered.'

Alternative 2

Complies with LRMP and Forest Service direction regarding TES plants?

Alternative 2 complies with LRMP S&Gs relative to botany, and therefore is in compliance with SNF and Forest Service direction regarding TES plants.

Alternative 3

Complies with LRMP and Forest Service direction regarding TES plants?

Alternative 3 complies with LRMP S&Gs relative to botany, and therefore is in compliance with SNF and Forest Service direction regarding TES plants.

Alternative 4

Complies with LRMP and Forest Service direction regarding TES plants?

Alternative 4 complies with LRMP S&Gs relative to botany, and therefore is in compliance with SNF and Forest Service direction regarding TES plants.

Alternative 5

Complies with LRMP and Forest Service direction regarding TES plants?

Alternative 5 complies with LRMP S&Gs relative to botany, and therefore is in compliance with SNF and Forest Service direction regarding TES plants.

3.12 Noxious Weeds

3.12.1 Introduction

In 2003, the Chief of Forest Service identified invasive weed species (noxious weeds) as one of four critical threats to the Nation's ecosystems. Invasive species can be aggressive invaders of native plant communities and are capable of dominating native habitat types, excluding native vegetation and reducing diversity and productivity of native plant species and communities. On National Forest System lands as of 1999, an estimated 6 to 7 million acres were infested with weeds, with infestations potentially increasing at a rate of 8-12 percent per year (USDA-FS 1999).

Around this time it was recognized that the Sierra Nevada was relatively free of noxious weeds but was at risk. The SNFPA added Noxious Weeds as one of five "problem areas" with an urgent need for new land management direction for the 11 Sierra Nevada National Forests (USDA-FS 2001, 2004a). In 1998, the SNF was a founding member of the Sierra-San Joaquin Noxious Weed Alliance, a Weed Management Area for Fresno, Madera and Mariposa counties. Also in 1998, in response to concern over rapid spread of noxious weeds (especially yellow starthistle), the SNF began to implement a strong integrated weed management program focused on prevention, education and early detection/rapid response as directed in the Forest Service Manual (FSM 2081.2). A significant overriding theme for the SNF and environs is the fact that most of the land base in the Forest is still not yet infested with noxious weeds. This is especially true at higher elevations of the Sierra Nevada in general (Botti 2001) and the SNF in particular.

Invasive weeds are spread in a variety of ways: vehicles, heavy equipment, bicycles and hikers' shoes and gear are just some of the vectors related to humans. Wildlife, water and wind are also factors. Motor vehicle use contributes to the introduction and spread of noxious weed species by creating suitable environmental conditions for establishment and by acting as major vectors for spread as well as by physically bringing weed propagules to the forest (Trombulak and Frissell 2000).

This section describes the affected environment and environmental consequences for invasive plant species (weeds). It describes the area potentially affected by the alternatives and existing resource conditions within that area. Measurement indicators are used to describe the existing conditions for the forest. The measurement indicators are then used in the analysis to compare effects of the alternatives and to describe how well the proposed action and alternatives meet the project objectives and address concerns about noxious weed introduction and spread.

Regulatory Framework

The State and Federal laws, Forest Service direction and other regulatory direction that is relevant to the management and prevention of noxious weeds applicable to this project include:

FSM 2081.03 requires that a weed risk assessment be conducted when any ground disturbing activity is proposed and that the level of risk of introducing or spreading noxious weeds associated with the proposed action be disclosed and addressed. Projects having moderate to high risk of introducing or spreading noxious weeds must identify noxious weed control measures that must be undertaken during project implementation.

Executive Order 13112 of Feb. 3, 1999 directs Federal agencies to prevent the introduction of invasive species; to detect and respond rapidly to and control such species; to not authorize, fund or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless the Agency has determined and made public its determination that the

benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

Sierra Nevada Forest Plan Amendment (USDA-FS 2004a). Standards and Guidelines for Noxious Weed Management relevant to the Travel Management EIS are listed below (there was no noxious weed management direction in the original 1991 Forest Land and Resource Management Plan):

- Inform forest users, local agencies, special use permittees, groups and organizations in communities near National Forests about noxious weed prevention and management.
- Work cooperatively with California and Nevada State agencies and individual counties (for example, Cooperative Weed Management Areas) to: (1) prevent the introduction and establishment of noxious weed infestations and (2) control existing infestations.
- As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy to develop mitigation measures for high and moderate risk activities.
- When recommended in project-level noxious weed risk assessments, consider requiring off-road equipment and vehicles (both Forest Service and contracted) used for project implementation to be weed free. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
- Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
- Conduct follow-up inspections of ground disturbing activities to ensure adherence to the Regional Noxious Weed Management Strategy.
- Encourage use of certified weed free hay and straw. Cooperate with other agencies and the public in developing a certification program for weed free hay and straw. Phase in the program as certified weed free hay and straw becomes available. This standard and guideline applies to pack and saddle stock used by the public, livestock permittees, outfitter guide permittees and local, State and Federal agencies.
- Include weed prevention measures, as necessary, when amending or re-issuing permits (including, but not limited to, livestock grazing, special uses and pack stock operator permits).
- As outlined in the Regional Noxious Weed Management Strategy, when new, small weed infestations are detected, emphasize eradication of these infestations while providing for the safety of field personnel.
- Routinely monitor noxious weed control projects to determine success and to evaluate the need for follow-up treatments or different control methods. Monitor known weed infestations, as appropriate, to determine changes in weed population density and rate of spread.

Many of these standards and guidelines refer to the “Regional Noxious Weed Management Strategy” which incorporates by reference the following document: USDA Forest Service Guide to Noxious Weed Prevention Practices, available on the Web at the following link:

http://www.fs.fed.us/invasivespecies/documents/FS_WeedBMP_2001.pdf

Effects Analysis Methodology

The approach to this analysis involved compiling known information (historical data) on weed species of concern to the SNF (Clines 2008; Tuitele-Lewis 2008), conducting field surveys of roads, motorized trails and areas proposed for the various alternatives and using these data sources to develop project mitigation measures for NFTS facilities going through or near noxious weed infestations as well as to compare the effects of the alternatives.

Noxious weed species considered in this analysis are listed in Table 3- 126 in the Affected Environment section below. The species being considered are invasive non-native plants that possess one or more of the characteristics of a noxious weed and are undesirable on SNF lands. Based on Executive Order 13112, issued in 1999, a species is considered invasive if it: a) is non-native to the ecosystem under consideration and b) its introduction causes or is likely to cause economic or environmental harm or harm to human health (USDA-FS 2004b). This analysis focuses on plants known to occur on or near the SNF that are listed as noxious by the California Department of Food and Agriculture (CDFA, 2009) or have been placed on the list of wildland weeds published by the California Invasive Plant Council (Cal-IPC 2009).

All of the weed species identified on the SNF are of concern with regard to their potential to spread and damage native ecosystems; however, the SNF has prioritized certain weed species for surveying, monitoring and treatment due to their observed level of invasiveness and effects to local ecosystems. Species that are rated ‘A’ or ‘B’ by CDFA and/or Cal-IPC species rated as high or moderate priority are rated as high priority species for the purposes of this analysis if they warrant it based on their behavior in the central Sierra Nevada. The potential for spread of these species coupled with the capability of motor vehicles to inadvertently spread such weeds would constitute a moderate or high risk with regard to the requirements of FSM 2081.03 (noxious weed risk assessments for NEPA decisions are to rate projects as low, medium or high risk for introduction and spread of noxious weeds and to implement project mitigation measures to reduce the risk for medium and high risk projects).

Assumptions Specific to the Noxious Weed Analysis

1. This project is a ground disturbing activity requiring a weed risk assessment. This section constitutes the noxious weed risk assessment
2. It is assumed infestations will continue to be introduced to the SNF by a variety of means. Motor vehicles will bring weed seeds and propagative parts from home areas and other areas where they traveled through weed infestations.
3. Existing weed infestations will likely spread without control programs specifically intended to eliminate weeds along roads, motorized trails and Open Areas. Rate of spread will be increased by vehicular activity. Infestations located along routes where vehicles drive will spread further along the route.
4. For this risk assessment, the following categories were assigned to individual proposed roads, motorized trails and areas to compare the risk of noxious weed spread or introduction among alternatives. These categories were assigned as follows:

- a. The risk of spread was considered high if the species is known to be highly invasive and aggressive in the SNF and the infestation is within 200 feet of a proposed facility.
 - b. Risk of spread is considered to be medium if known populations of noxious weeds do not occur directly along travel routes where travel is prohibited. Also, if the species that occur are considered to be less invasive and already fairly well-distributed the risk of further explosive spread is considered to be medium.
 - c. The risk of introduction or spread was considered low if existing inventories demonstrated that weed populations are not present or infestations are present, but the facility is not proposed for designation.
5. It is assumed that the dynamics of weed spread are not substantially affected by changes in vehicle class for a given facility (e.g. changing a motorcycle route to one used by all types of motor vehicles would not increase or decrease the chance that weeds would be spread).
 6. Open Areas include cross-country areas that are open to all vehicles, parking areas that are open to 'highway-legal vehicles only', and staging areas that are open to 'highway-legal vehicles only'. Of the three types, those open to all vehicles tend to have the highest impact. To be conservative, all three types will be analyzed as if they were open to all vehicles and analyzed for the highest level of impact. As such, the three different types of areas will not be analyzed separately. Throughout the remainder of this report, they will be cumulatively referred to as Open Areas or areas.

Data Sources

Known (historic) information: During the planning process, maps of known noxious weed and invasive non-native plant infestations (SNF noxious weed GIS database) were compared with motorized trails, roads and areas included in the proposed action and alternatives. Information on known weed infestations was organized by proximity to motorized trails, roads and areas as well as by analysis unit. Also considered important (especially for considering the prohibition of cross-country travel) were known concentrations of noxious weeds along major travel ways leading to the Forest and in major population centers near the SNF.

Field surveys: Botanical field surveys were conducted from 2007 through 2009 along proposed facilities. All proposed routes and roads were walked; areas within 200 ft of either side of the route were examined. All proposed areas were also surveyed in 2007 or 2008 for noxious weeds. Historical data from the SNF GIS database was used to inform survey work and known populations of noxious weeds were visited to assess their current status. This information was entered into a database and is documented in the Recreation and Resource Data Report in the project record. This data is also being incorporated into the SNF GIS database.

Noxious Weed Measurement Indicators

- High priority noxious weed infestations by species within each analysis unit.
- Number of miles of facilities added (the more miles added, the higher the likelihood of new noxious weed species and/or infestation being brought to the SNF).
- Number of proposed motorized trails, roads or areas with noxious weed infestations within 200 feet.
- Overall miles open for use each month of the year.

- Overall amount of land base of SNF that would potentially receive use by motor vehicles.
- Number of noxious weed infestations by species within the ten analysis units.

Noxious Weeds Methodology by Action

Four actions are being proposed in this project: (1) the prohibition of cross-country travel, (2) adding facilities to the NFTS and (3) changes to the NFTS, and (4) two non-significant LRMP amendments. Effects from noxious weeds must be considered both spatially and temporally, along with indicators appropriate for comparing alternatives. The methodology and indicators are summarized for each of these actions below:

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

Short-term timeframe: 1 year. Short-term effects include immediate effects from changes in travel management that will be evident within the first year of implementation.

Long-term timeframe: 20 years. Climate change, unforeseeable future projects, demographic changes, etc. make assumptions beyond this time frame speculative.

Spatial boundary: The ten analysis units (SNF, excluding wilderness areas, Research Natural Areas, Roadless Areas and Botanical Areas) where cross-country travel has been occurring.

Indicator(s): High priority noxious weed infestations by species within each analysis unit.

Methodology: A qualitative comparison of the alternatives using GIS analysis of existing unauthorized routes in relation to noxious weed infestations and a discussion of the likely changes in the pattern of weed spread based on observations in the SNF over the past 10 years

2. Direct and indirect effects of adding facilities (roads, motorized trails, areas) to the NFTS, including identifying seasons of use.

Short-term timeframe: 1 year (see above).

Long-term timeframe: 20 (see above).

Spatial boundary: Areas within 200 ft of proposed motorized trails, roads and areas (facilities) are the boundary for analysis of noxious weed effects as infestations beyond 200 ft are assumed to be less likely to be spread by use of proposed facilities.

Indicator(s): (1) Number of miles of facilities added (the more miles added, the higher the likelihood of new noxious weed species and/or infestation being brought to the SNF). (2). Number of proposed motorized trails, roads or areas with noxious weed infestations within 200 feet. (3) Overall number of miles open for use each month of the year.

Methodology: (1) Botanical survey of proposed motorized trails, roads and Open Areas; (2) GIS analysis of added NFTS facilities in relation to noxious weed locations (3) Qualitative comparison of overall number of miles and months motorized trails and roads are open under each alternative (Season of use/Prohibition of NFTS Use tables were used for this).

3. Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads). It is assumed that changing vehicle class does not change risk of weed spread (see assumptions in section 3.12.1).

Short-term timeframe: 1 year (see above).

Long-term timeframe: 20 years (see above).

Spatial boundary: Analysis units (see above).

Indicator(s): (1) Overall amount of land base of SNF that would potentially receive use by motor vehicles.

Methodology: (1) Qualitative comparison of Season of Use / Prohibition of NFTS Use tables (miles of roads open by date under each alternative).

4. Non-significant LRMP Amendment

As explained in section 3.1.1 the non-significant LRMP amendments do not have unique effects when compared to the other actions analyzed in this FEIS. Therefore the environmental consequences have been analyzed and will not be discussed further in the noxious weed resources section.

5. Cumulative Effects

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial boundary: Forestwide (in areas accessible by vehicles). Cumulative effects for weed species in the project area have the potential to affect any area in the SNF that can be driven and over time, areas beyond that.

Indicator(s): (1) Number of noxious weed infestations within 200 ft of a proposed route, road or Open Area, (2) Number of noxious weed infestations by species within the 10 analysis units.

Methodology: (1) Botanical survey of proposed motorized trails, roads and Open Areas; (2) GIS analysis of all unauthorized routes and noxious weed infestations.

3.12.2 Affected Environment

Of the more than 1350 vascular plants known to occur in the SNF, less than 30 species are considered to be noxious weeds or invasive non-native plants requiring active management by the SNF. Noxious weeds considered relevant for the project area are shown in Table 3- 126, along with their State Noxious Weed rating (if rated) and the California Invasive Plant Council (Cal-IPC) rating (if rated). There are no weeds on the Federal Noxious Weed List in the project area.

Table 3- 126. SNF Noxious Weed Species Relevant for the Travel Management FEIS

Scientific Name	Common Name	Cal-IPC Rating ¹	State Pest Rating ²	P = Present in SNF (or approx. acres if known), N = near SNF, reasonable to expect within next 5 years.	Analysis Units
<i>Bromus tectorum</i>	Cheatgrass	High		10,000	All
<i>Cardaria chalepensis</i>	Lens-podded hoary cress	Moderate	B	< 1	Tamarack-Dinkey
<i>Cardaria pubescens</i>	Hairy whitetop	Limited	B	N	Dinkey-Kings
<i>Carduus pycnocephalus</i>	Italian thistle	Moderate	C	500+	South Fork Merced, Westfall, Gaggs, Mammoth, Jose-Chawanakee, Dinkey-Kings
<i>Centaurea diffusa</i>	Diffuse knapweed	Moderate	A	<5	Westfall
<i>Centaurea maculosa</i>	Spotted knapweed	High	A	< 1	South Fork Merced, Westfall, Globe, Gaggs, Mammoth, Jose-Chawanakee, Tamarack-Dinkey, Dinkey-Kings.
<i>Centaurea melitensis</i>	Tocalote	Moderate		1000 – 10,000	South Fork Merced, Westfall, Gaggs, Mammoth, Jose-Chawanakee, Dinkey-Kings
<i>Centaurea solstitialis</i>	Yellow starthistle	High	C	3000	South Fork Merced, Westfall, Gaggs, Mammoth, Stump Springs-Big Creek, Jose-Chawanakee, Tamarack-Dinkey, Dinkey-Kings
<i>Cirsium vulgare</i>	Bull thistle	Moderate		1000	All
<i>Cytisus scoparius</i>	Scotch broom	High	C	500	All but East of Kaiser Pass
<i>Genista monspessulana</i>	French broom	High	C	<5	South Fork Merced, Gaggs, Mammoth,
<i>Hypericum perforatum</i>	Klamathweed	Moderate	C	500	All but East of Kaiser Pass
<i>Lepidium latifolium</i>	Perennial pepperweed	High	B	P	Dinkey-Kings, Stump Springs-Big Creek
<i>Spartium junceum</i>	Spanish broom	High		500	All but East of Kaiser Pass
<i>Taeniatherum caput-medusae</i>	Medusahead	High	C	<5	Westfall, Mammoth, Jose-Chawanakee, Dinkey-Kings
<i>Verbascum thapsus</i>	Woolly mullein	Limited		500	All

¹ <http://www.cal-ipc.org/ip/inventory/index.php#definitions>

² http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm

Surveys were carried out between 2007 and 2009 across the project area. Survey parameters were roads, motorized trails or areas being proposed as well as unauthorized routes adjacent to them when weeds were clearly likely to reach the proposed facility due to the proximity. Infestations within 30 m (100 ft) were considered for analysis; infestations within 60 m (200 ft) were considered based on relative size of infestation and risk of spread for indirect effects. Unauthorized routes that lead to or from the proposed facilities were also considered if noxious weed populations were thought to pose some risk of spread due to their location or risk level. Refer to the introduction for the Botanical Resources chapter in the FEIS for general information about the vegetation in the ten analysis units. All proposed roads, motorized trails and areas in Alternatives 2, 4 and 5 were surveyed by a SNF botanist in 2007 or 2008.

Despite the very real fact that invasive weeds continue to be introduced to new sites in the SNF via a variety of vectors (including motor vehicle use), it is important to emphasize that a coordinated effort for inventorying, controlling and preventing noxious weeds and invasive non-native plants has been ongoing in the SNF since 1998. As a member of the Sierra-San Joaquin Noxious Weed Alliance, the SNF is involved in cooperative efforts bringing together landowners and managers (private, city, county, State and Federal) for the purpose of controlling invasive weed species. New infestations of State A and B rated weeds are controlled promptly by county or California State Department of Food and Agriculture biologists or by Forest Service employees.

Because non-native species differ in their degree of invasiveness and competitiveness, each species warrants different levels of concern. Information on the biology and impacts of individual weed species found within the analysis unit is presented below.

Cheatgrass (*Bromus tectorum*) is found throughout California and the West but is less abundant at higher elevations in the SNF. Cheatgrass is the most widespread invasive plant in the U.S. and has a Cal-IPC rating of high. Cheatgrass out competes native and desirable species, including perennial herbaceous, shrub and tree species, for soil moisture (Bossard et al. 2000). However, SNF botanists have observed that the potential for cheatgrass to cause ecological problems varies considerably according to local conditions such as climate and disturbance regime and to date this has not posed the most severe threat to SNF ecosystems relative to the knapweeds, brooms and the non-native thistles.

Hoary cress: Two species are of concern in and near the SNF: Lens-podded hoary cress was found in 2002 in the vicinity of Dinkey Creek Road near the junction with McKinley Grove Road. This species is a B-rated (CDFA) noxious weed that is exceptionally difficult to control, as it has an extensive underground, horizontal stem system that produces new plants from stem and root fragments. Up to 75 percent of the biomass is underground. Herbicide use, monthly tilling for several years or sustained flooding are the only known ways to effectively control this weed (CDFA 2008). The original infestation of lens-podded hoary cress was hand-pulled and bagged in summer 2003 to prevent the plants from dropping seeds. In 2006, a hazard tree timber sale occurred within the lens-podded hoary cress infestation and equipment used for this operation subsequently traveled to other areas on the forest (Ballard 2006). The degree to which this weed has now spread is not known. Globe-podded hoary cress (*Cardaria pubescens*) was discovered at road's edge along State Highway 168 near Shaver Lake in 2008, in a frequently used turnout used by countless recreationists heading for the SNF.

Italian thistle (*Carduus pycnocephalus*) has been spreading rapidly in the foothills of the Sierra Nevada over the past 10 years and has now been found as high as 4,000 feet elevation. This is an annual weed introduced from Europe in the 1930s. This species spreads by mucilaginous (sticky) seeds via wind, animals and vehicles and can blanket the ground with dense stands of plants that allow no other species to grow (Bossard 2000). Small patches of Italian thistle that may have

been transported by motorcycles were found in Miami Motorcycle area in 2004 and promptly removed by SNF botanists.

Knapweeds: Both spotted knapweed (*Centaurea maculosa*) and diffuse knapweed (*C. diffusa*) are bushy, aggressive perennial weeds that have displaced native vegetation catastrophically in other parts of the western U.S. with similar climates to the Sierra (e.g. the Rocky Mountains). Both of these species have the potential for severe damage to ecosystems, recreation, ranching economies, and watershed integrity (CDFA 2009). Both are A-rated pests considered highest priority for eradication by the California Department of Food and Agriculture (CDFA 2009). One infestation of diffuse knapweed exists near Chowchilla Mountain Road, in Mariposa County. Since 2001, about 20 new infestations of spotted knapweed have been found in and near the SNF and most have been promptly eradicated. The rate of arrival and detection of spotted knapweed seems to be increasing, most have been found along roadsides, but some infestations were tracked to contractors' vehicles from out of State and some have been accidentally transported in log cabin kits from the Rocky Mountain States. There are nine sites in the project area where spotted knapweed has been eradicated (1 SFM, 2 WES, 3 GLO, 1 SSB and 1 TAD). There are four sites in the project area with active spotted knapweed sites (2 WES, 2 TAD).

Yellow starthistle (*Centaurea solstitialis*) has been a primary target of the SNF weed program since 1998. This spiny annual plant has increased its range in California exponentially since it was first introduced in the mid-1850s to its current estimated range of 15 million acres (15 percent of the State of California). On public lands, yellow starthistle renders recreational areas useless due to its painful spines. Plants are toxic to horses and out-compete more desirable plants on rangelands, reducing productivity of the land. The Sierra-San Joaquin Noxious Weed Alliance has successfully used the concept that yellow starthistle was advancing upslope in the SNF along a "leading edge" of outlier infestations that were still small enough to eradicate. Control efforts have focused on preventing the leading edge of yellow starthistle from continuing to move upslope (primarily via roads) and have been successful in moving the leading edge downwards with the ultimate goal of keeping the SNF free of this weed. With major infestations thriving in the Central Valley and other parts of California, it is a weed that will continue to be introduced to the Forest on tires and in contaminated soil, it is recognized that a strong early detection and rapid response program will always be necessary to prevent re-infestation. There are infestations of yellow starthistle in the SFM, WES and JCH analysis units.

Tocalote (*Centaurea melitensis*) is similar in appearance to yellow starthistle, but is already a more established and probably less aggressive, component of the vegetation. In the foothills, especially in the three major river canyons of the SNF, tocalote is found over broad areas, sometimes in dense patches that preclude native plants, but often at lower densities that seem to allow coexistence of native plants. Plants tend to grow more densely along roads, which means they will continue to be spread via vehicles picking up seed in their tires (J. Clines, SNF Botanist, field observations). Except for small new outlier patches, control of tocalote is beyond the capabilities of SNF personnel. The prevention of spread into clean areas is the most effective strategy at this point.

Bull thistle (*Cirsium vulgare*), although generally not as invasive as other noxious thistles, competes with and displaces native species and decreases forage values in meadows at elevations up to 7,000 feet elevation (Bossard, et al. 2000). Bull thistle does not seem more prevalent along motor vehicle proposed facilities than elsewhere in the Forest. Cal-IPC rates bull thistle as having Moderate ecological impact, but notes that this species can be very problematic regionally and especially in riparian areas (CAL-IPC 2008)

Brooms: Scotch broom (*Cytisus scoparius*), **Spanish broom** (*Spartium junceum*) and **French broom** (*Genista monosperulana*) are all non-native, aggressive shrubs that can expand rapidly

across disturbed lands and form monocultures. The foliage is toxic to wildlife, the seeds are long-lived and hardy and Scotch and Spanish broom are highly flammable due to the presence of volatile oils in the foliage (CDFA 2009). These species are concentrated in the vicinity of Bass Lake, Blue Canyon, Big Creek and Stump Springs Road, as well the San Joaquin River Canyon downstream of the Forest. Some control by manual and chemical means has been done each year but none of the infestations are yet eradicated. Several infestations of French broom were discovered in 2007 along dirt roads leading to Feliciano Ridge, these could be spreading via vehicle tires annually, as no removal has been done yet (Clines 2007). As most of the broom sites in Forest occur along roads, vehicle tires could pick up contaminated soil and move seeds to new sites.

Perennial pepperweed (*Lepidium latifolium*) is a deep-rooted perennial herb that has been found in two sites in wetlands near Shaver Lake. Both infestations, though found in 2002, are still present. One infestation is along State Highway 168 in Fresno County, just outside the SNF near Shaver Lake and large plants (over 4 feet tall) were seen leaning into the roadway in full bloom in 2008. Plants were removed and bagged in 2008, but in previous years seeds were likely released onto the asphalt and carried to new sites by vehicle tires. New infestations of this noxious weed are expected to show up elsewhere in the SNF as a result. This species is a threat to wetlands and once established is extremely difficult to control (CDFA 2009).

Medusahead (*Taeniatherium caput-medusae*) is the most troublesome of the non-native annual grasses found in the Forest. This grass invades rangelands and replaces desirable forage plants. The high proportion of silica found in its tissues slows decomposition of medusahead, resulting in thick thatches of residual plants. Medusahead seeds are able to germinate through this thatch but most other plants cannot, thus infestations spread and persist (CDFA 2009). Superficially this grass is not visually distinctive to a layperson, thus new infestations are not reported to SNF weed personnel with the same frequency as more obvious species (e.g. yellow starthistle, brooms, spotted knapweed). This species doubtless travels on muddy tires as it grows along dirt roads in the vicinity of Bass Lake, Sivils Meadow, Burrough Mountain and Jose Basin.

Mullein (*Verbascum thapsus*) is considered a Cal-IPC weed of Limited impact, but has seeds that are long-lived in the soil. After fires, high densities of mullein plants can prevent revegetation with native species (Bossard 2000). Other types of disturbance, such as churning of soil by motor vehicles, can have similar effects.

3.12.3 Environmental Consequences

Introduction

See the effects methodology section above regarding how this analysis was conducted. Noxious weeds and invasive non-native plants found during botanical surveys along proposed facilities are listed for each alternative in Table 3- 127.

Table 3- 127. Summary of Noxious Weed Species Found on or Near Unauthorized Routes (Alt 1) or Proposed NFTS Facilities (Alts 2, 4 and 5) by Alternative

Species	Analysis Units	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Cheatgrass	Westfall; East of Kaiser Pass	X	X	N/A	X	X
Spotted knapweed	Dinkey Kings	X		N/A	X	X
Yellow starthistle	Westfall; South Fork Merced	X		N/A		X
Bull thistle	Westfall; Globe; Gaggs; Tamarack-Dinkey; Dinkey-Kings	X	X	N/A	X	X
Klamathweed	Westfall; Gaggs	X		N/A	X	X
Woolly mullein	Tamarack-Dinkey	X		N/A		

Where weed infestations were found growing directly adjacent to proposed facilities, close contact with vehicles and/or riders would enable spread of seeds from the parent plant as weed species have evolved this type of strategy (dispersal by wind, water and contact with animal vectors). The spread of these species would occur and their subsequent establishment in new areas would make it harder for control or eradication efforts by the SNF. Invasive non-native species have been observed to increase in areas of regular motor vehicle use (Prose, Metzger and Wilshire 1987). Impacts from weeds would not only harm native plants through competition for resources (light, water, nutrients) but also impact local wildlife species (which do not browse most noxious weeds), grazing and recreation activities outside of motor vehicle riding (hiking, camping, equestrian activities (Bossard 1991; Randall 1996; Bangsund, Leistritz and Leitch 1999; Eiswerth et. al 2005).

The overall risk of weed introduction and spread by alternative is summarized below in Table 3-128. Weeds that were actually found along proposed roads, motorized trails and areas are distinguished with an asterisk. The remaining species are shown because they exist in or near the Forest along major travel ways where they are likely to be spread by motor vehicle use of the SNF (see Affected Environment).

Table 3- 128. Risk of Spread of Noxious Weeds by Alternative

Species	Alt 1	Alt 2	Alt 3 ¹	Alt 4	Alt 5
Cheatgrass*	Moderate	Low to Moderate	N/A	Low to Moderate	Low to Moderate
Tocalote*	Moderate	Low	N/A	Low	Moderate
Yellow starthistle*	High	Low to Moderate	N/A	Low to Moderate	Moderate to High
Bull thistle*	Moderate	Moderate	N/A	Moderate	Moderate
Klamathweed*	High	Moderate	N/A	Moderate	High
Common mullein*	Moderate	Low	N/A	Low	Low
Brooms (3 species)	Moderate to high	Low	N/A	Low	Low
Medusahead	High	Moderate	N/A	Moderate	Moderate
Italian thistle	High	Moderate	N/A	Moderate	Moderate
Whitetop (2 species)	Moderate	Low	N/A	Low	Low
Perennial pepperweed	Moderate to High	Low	N/A	Low	Low to Moderate
Spotted and diffuse knapweed	Moderate to high	Moderate	N/A	Moderate	Moderate
Overall risk of weed introduction and spread:	Moderate to high	Low to moderate	Low to none	Low to moderate	Moderate

1. Risk for Alternative 3 is not applicable (N/A) because this alternative does not propose any additions to the NFTS.

Alternative 1 –No Action

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

All noxious weed species listed in Table 3- 126 are located within the project area and therefore could be further spread by motor vehicle riding under this alternative. Close contact with vehicles and/or riders would enable spread of propagules from the parent plant as discussed above. As weeds spread and proliferate, their subsequent establishment in new areas would make it harder for control or eradication efforts by the SNF, primarily because cross-country travel would result in far too large of a potential area for Forest Service weed staff to check regularly (in contrast to designated facilities which could be systematically surveyed). Thus early detection and rapid control of new, small infestations is less likely with continued cross-country travel. In other words, the likelihood is greater that new infestations would establish and spread across larger areas before detection, thus becoming too expensive to treat or eradicate.

Table 3- 128 displays the risk of spread among alternatives. Table 3- 129 below shows the risk of spread posed by motor vehicle activity under this alternative.

Additions to the NFTS

There are no additions to the NFTS proposed in Alternative 1.

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

There are no changes to the NFTS proposed in Alternative 1 and no change from current condition for plant species.

Table 3- 129. Alternative 1 – Risk of Weed Introduction and Spread

Species	Risk of Spread
Cheat grass*	Moderate
Tocalote*	Moderate
Yellow starthistle	High
Bull thistle*	Moderate
Klamathweed*	High
Common mullein*	Moderate
Brooms (3 species)	Moderate
Medusahead	High
Italian thistle	High
Whitetop (2 species)	Moderate
Perennial pepperweed	Moderate – High
Spotted and diffuse knapweeds	Moderate – High

* Species were those found along facilities during surveys. Other weed species listed are aggressive weed species currently observed to be spreading on the SNF.

Thus, the overall risk of spreading noxious weeds posed from this alternative is moderate to high.

Alternative 2

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Prohibiting cross-country motor vehicle travel under this alternative will greatly reduce the risk of noxious weed spread as compared to Alternative 1. Reducing the amount of unauthorized routes available from 552 miles under Alternative 1 to 44 miles will also greatly help in decreasing the risk of noxious weed spread. Direct and indirect effects resulting from this prohibition are the reduced amount of mileage in which motor vehicle riders could be conceivably in contact with weed plants or propagules. Reduced contact with those plants and with soil containing weed seeds reduces the probability that seeds will be transported by vehicles. Because prohibiting cross-country travel reduces the geographic area over which new weed introductions might occur, Forest Service staff are more likely to detect new infestations early while they are still small and easily controlled. Early detection and rapid response are key components of successful weed control programs.

Additions to the NFTS

Indicator 1- Number of miles of facilities added. Alternative 2 proposed motorized trails and roads total approximately 44 miles. This compares with approximately 552 miles of unauthorized routes in Alternative 1), 0 miles in Alternative 3, 51 miles in Alternative 4 and 85 miles in Alternative 5. Thus Alternative 2 poses a much lower risk than Alternative 1 and an intermediate level of risk of weed introduction and spread compared to the other action alternatives.

Indicator 2- Number of proposed motorized trails, roads or areas with noxious weed infestations within 200 feet.

Table 3- 130 and Table 3- 131 list the species affected by proposed facilities discussed in the analysis below.

PROPOSED ROAD AND MOTORIZED TRAIL ADDITIONS

Bull thistle

Five proposed motorized trails are within 200 feet of bull thistle infestations. These proposed trails include JH-104, JH-105, JH-107, JH-125 and SR-112. Direct effects expected over the next year would be movement of seeds and contaminated soil via motor vehicles – either expanding the area of current infestations or transporting seeds to new sites where new infestations would then establish. Indirect effects (over the next 20 years) would be that continued soil disturbance within an active weed infestation may favor bull thistle over the surrounding native vegetation.

JH-104, JH-105, JH-107 and JH-125, all located in Tamarack-Dinkey analysis unit, link to each other in a relatively short route. The spread of propagules without any treatment is likely over time but the overall impact would be low as bull thistle is locally common in the SNF in montane forest vegetation types. SR-112 is found in Westfall analysis unit and will have the same direct and indirect effects. The following prescriptive action would be applied to these five proposed facilities: manually treat each occurrence with hand tools or pulling for at least one year before bringing the route into the system. Subsequent monitoring would occur periodically at an interval to be determined by a SNF botanist. The overall risk posed by bull thistle from Alternative 2 is low with treatment and low to moderate until treatments are implemented.

Klamathweed

Route PK24 in the Westfall analysis unit goes through a Klamathweed infestation. While the risk of spread is much reduced from Alternative 1, direct effects over the next year would be increased acreage of existing infestations and spread of seeds to new areas, resulting in new infestations. The prescriptive action for this plant are the same as for bull thistle: manual control would occur for at least 1 year before the route can be brought in the system this action, coupled with subsequent monitoring at an interval to be determined by a SNF botanist would reduce the risk of spread to low.

Table 3- 130. Alternative 2 – Unauthorized Routes Proposed to be added as NFTS Motorized trails

Route	Affected Species	# of Infestations	Resource Issue	Risk of Spread	Analysis Unit
PK24	Klamathweed	2	NX-1	Moderate	Westfall
SR-112	bull thistle	1	NX-1	Low to moderate	Westfall

Table 3- 131. Unauthorized Routes Proposed to be added to the NFTS of Roads

Route	Affected Species	# of Infestations	Resource Issue	Risk of Spread	Analysis Unit
JH-104	bull thistle	1	NX-1	Low to moderate	Tamarack-Dinkey
JH-105	bull thistle	1	NX-1	Low to moderate	Tamarack-Dinkey
JH-107	bull thistle	1	NX-1	Low to moderate	Tamarack-Dinkey
JH-125	bull thistle	1	NX-1	Low to moderate	Tamarack-Dinkey

PROPOSED OPEN AREA ADDITIONS

No areas proposed under this alternative would be affected by noxious weeds so there are no effects for Open Areas.

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

It is assumed that changing vehicle class does not change risk of weed spread (see assumptions in section 3.12.1).

Indicator 1 – Overall amount of land base of SNF that would potentially receive use by motor vehicles.

SEASON OF USE (INCLUDING YEAR-ROUND)

Application of seasons of use in Alternative 2 would pose less risk of noxious weed introduction and spread than Alternative 1, and would be comparable to the other action alternatives. Seasonal closures would protect many native plant species from indirect effects such as soil erosion, deposition and compaction (healthy native plant communities are better able to resist weed invasion). The absence of vehicles until later in the spring or early summer would prevent some weed species from dispersing seeds via mud on vehicles because prescriptive measures (hand-pulling) could be done before public use is permitted. This would result in lower rates of dispersal across the NFTS. Year-round closures would slow dispersal rates for noxious weeds as well as diminish disturbance to native plant communities, thereby reducing the ability for noxious weed propagules to become established.

Cumulative Effects

Long-term risk of weed introduction and spread under Alternative 2 along other past, present and reasonably foreseeable projects across the Forest it is likely to be lower than under Alternative 1. With a reduced transportation system in place and the prohibition of cross-country travel, the contribution of Alternative 2 to the spread and establishment of weeds on the SNF would not push the forest over any thresholds of cumulative effects for weed spread (much less likely than under Alternative 1). Over time, with continued control, monitoring and eradication efforts by the SNF for all weed species shown in Table 3- 126, this alternative will greatly aid in diminishing vectors for noxious weeds by having a defined, manageable system that could be regularly surveyed.

Alternative 3

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Risk of noxious weed spread would be similar to those listed under Alternative 2 except there will not be any proposed additions to the NFTS for Alternative 3. This reduces the amount of mileage from approximately 552 miles to 0 miles being proposed for the SNF for facilities added. The reduction to 0 miles and acres added for motorized facilities enhances the effectiveness of prohibiting cross-country travel for noxious weeds.

Additions to the NFTS

There are no additions to the NFTS proposed in Alternative 3.

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

There are no changes to the NFTS proposed in Alternative 3 and no change from current condition for TES plant species.

Cumulative Effects

Cumulative effects of Alternative 3 and other past, present, and reasonably foreseeable future projects in the non-wilderness portions of the SNF for noxious weeds are greatly reduced in comparison to other alternatives for the Travel Management EIS. With no added facilities and only the NFTS to consider, the risk for spreading noxious weeds is low under Alternative 3; applicable projects that would contribute cumulative effects for risk of spread would include hazard tree sales, fuels treatments, road maintenance, and special use projects involving construction or maintenance. Therefore the cumulative effects for this alternative are considered low relative to the other alternatives, especially Alternative 1.

Alternative 4

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

The risk of noxious weed spread by prohibition of cross-country travel is similar to that discussed in Alternative 2 with the exception of added facilities proposed in the section below.

Additions to the NFTS

Indicator 1- Number of miles of facilities added. A summary of proposed motorized trails and roads containing noxious weeds within 200 ft or less from the route are listed in Table 3- 132 and Table 3- 133. Fifty-one (51) miles of roads or motorized trails are proposed in this alternative. In comparison, Alternative 1 has 605,000 acres open to motorized cross-country (approximately 552 miles of unauthorized routes), Alternative 2 would add 44 miles, Alternative 3 would add 0 miles and Alternative 5 would add 85 miles.

Indicator 2- Number of proposed motorized trails, roads or areas with noxious weed infestations within 200 feet.

Table 3- 132 and Table 3- 133 list the proposed facilities discussed in the analysis below.

PROPOSED ROAD AND MOTORIZED TRAIL ADDITIONS

Cheatgrass

Two proposed motorized trails are within 200 ft of two populations of cheatgrass. They are JM-38 and SR-36z in Westfall analysis unit. Direct effects after one year would be the spread of seeds by vehicles to other parts of the SNFTS; indirect effects within twenty years would be the continual disturbance in and around the known infestations, creating a favorable habitat for cheatgrass to thrive. Cheatgrass populations are frequently found in the SNF but most are small (< 1 acre) and do not seem to be endangering native plants or ecosystems to a large extent. It is also underreported in surveys as it is found often in small occurrences throughout the project area that do not impact species diversity in those areas and as a result, is not noted. Due to these factors, negative direct and indirect effects of spreading cheatgrass from these proposed motorized trail is considered low.

Bull thistle

Six proposed facilities are within 200 ft of eight populations of bull thistle.

Westfall- PK-09x and SR-36z

Tamarack-Dinkey- JH-104, JH-105, JH-107 and JM-51

Bull thistle is common especially in mixed-conifer forest on the SNF. While many areas have bull thistle, occasionally it can flourish and can have notable impact on understory plants, meadows and disturbed forest areas. The direct and indirect effect of these populations spreading beyond those facilities is considered moderate. Mitigations for this plant are the same as those listed for it under Alternative 2 with manual treatment occurring for at least 1 year before the route is opened. After these mitigations have been implemented, the risk of spreading bull thistle is considered to be low.

Klamathweed

Three proposed motorized trails are within 200 ft of two populations of Klamathweed. JM-38 and SR-36z are in the Westfall analysis unit; BP112 is located in Gaggs analysis unit. Klamathweed effects include the spread of propagules by vehicles and continual disturbance in or near areas of infestation. The risk of spread is moderate to high. As the Miami Mountain Motorcycle area (located in Westfall analysis unit) already has abundant Klamathweed, the risk of spread is only moderate for the immediate vicinity (spreading weeds to other areas already occupied by that weed). But if motor vehicle riders continue on to uninfested (clean) areas without cleaning their vehicles, the risk to those areas is high. BP112 is located in Gaggs, which also has abundant Klamathweed and so the risk of spread within the immediate vicinity is moderate but for outlying areas that will contain designated facilities without Klamathweed, the risk is higher.

Table 3- 132. Alternative 4 – Unauthorized Routes Added as NFTS Motorized trails

Route	Affected Species	# of Occurrences	Resource Issue	Risk of Spread	Analysis Unit
JM-38	Klamathweed, cheatgrass	1 each	NX-1	Moderate, Low	Westfall
BP112	Klamathweed	1	NX-1	Moderate	Gaggs
SR-36z	Cheatgrass, Bull thistle, Klamathweed	1 each	NX-1	Low, Moderate, Moderate	Westfall

Table 3- 133. Alternative 4 – Unauthorized Routes Added as NFTS Roads

Route	Affected Species	# of Occurrences	Resource Issue	Risk of Spread	Analysis Unit
JH-104	Bull thistle	1	NX-1	Moderate	Tamarack-Dinkey
JH-105	Bull thistle	1	NX-1	Moderate	Tamarack-Dinkey
JH-107	Bull thistle	1	NX-1	Moderate	Tamarack-Dinkey
JM-51	Bull thistle	1	NX-1	Moderate	Tamarack-Dinkey
PK-09X	Bull thistle	1	NX-1	Moderate	Westfall

PROPOSED OPEN AREA ADDITIONS

No proposed areas under Alternative 4 are expected to have any significant effects on noxious weeds.

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

It is assumed that changing vehicle class does not change risk of weed spread (see assumptions in section 3.12.1).

SEASON OF USE AND PROHIBITION OF NFTS USE

Effects are similar to Alternative 2.

Cumulative Effects

Cumulative effects from this alternative and other past, present, and reasonably foreseeable future forest projects on bull thistle and Klamathweed can be considered moderate without mitigation and low with mitigations taking place. As discussed before, the spread of both bull thistle and Klamathweed have occurred throughout the SNF and have done so through other vectors besides vehicles (animals, wind, water) but the potential impact to the proposed motorized trails and roads from these weeds is not insubstantial. With mitigations the risk of spread is low but not zero especially when considering projects and activities expected over the next 5 to 10 years (road maintenance, road hazard removal, prescriptive burns, thinning, grazing). Cheatgrass will likely continue to spread albeit slowly and is not expected to pose a significant threat to forest ecosystems as a result of this alternative and other concurrent projects.

Alternative 5

Direct and Indirect Effects

Cross-country Motor Vehicle Travel

Effects from the prohibition of cross-country travel on noxious weeds are similar to those analyzed under Alternative 2.

Additions to the NFTS

Indicator 1- There are 85 miles of facilities being proposed in this alternative. In comparison, Alternative 1 has 605,000 acres open to motorized cross-country (approximately 552 miles of unauthorized routes), Alternative 2 would add 44 miles, Alternative 3 would add 0 miles and Alternative 4 would add 51 miles. Table 3- 133 and Table 3- 134 list all known proposed motorized trails and roads that are known to have noxious weed effects.

Indicator 2- Number of proposed motorized trails, roads or areas with noxious weed infestations within 200 feet. See

Table 3- 134 and Table 3- 135 for the list of proposed facilities.

ROAD AND MOTORIZED TRAIL ADDITIONS

Cheatgrass

Two proposed motorized trails come within 200 ft of two populations of cheatgrass. These motorized trails include SR-36z and SV32 in Westfall analysis unit. Direct and indirect effects from this species are expected to be low due to its relatively low rate of spread on the SNF as discussed in Alternative 4. No mitigations are being implemented for these motorized trails.

Tocalote

One proposed motorized trail is found within 200 ft of one population of tocalote. This trail includes TH-10z in Dinkey-Kings analysis unit. Tocalote has spread across much of the Dinkey-Kings analysis unit in scattered occurrences totaling thousands of acres. Its ecological impact as of now seems not to be as severe as the closely related yellow starthistle on the SNF. However, some occurrences are large and noticeably dominate native plants in annual grasslands, oak woodlands and/or chaparral. Direct and indirect effects of this species will be low to moderate; the highest risk is the potential spread to another area that does not currently contain tocalote. No mitigations have been proposed at this time due to its inconclusive status on the SNF. If monitoring reveals spread by motor vehicles, then appropriate actions will be taken, including removing the trail from the Sierra MVUM until appropriate management has occurred.

Yellow starthistle

One proposed motorized trail is within 200 ft of one population of yellow starthistle. This trail is SV32 in Westfall analysis unit. Yellow starthistle may pose the highest relative risk of spread of any noxious weed species in Alternative 5. Control and eradication efforts on the SNF aim to keep this species at or below its current leading edge. This area is considered to be part of that leading edge, and the potential for vehicles to spread this species is high in this area. Negative direct and indirect effects from this species are considered high without treatment. With manual treatment done and monitoring in place, the risk could be lowered to acceptable levels. It is not yet decided how long after manual treatment occurs that the route should be opened but at the minimum it will be one year. Monitoring and treatment of the infestation will continue annually; if yellow starthistle shows sign of spreading beyond its known boundaries, the route should be taken off the MVUM until additional mapping, assessment and manual treatment occurs. Over 6000 plants were removed from the site in 2009.

Bull thistle

Fourteen proposed facilities are within 200 feet of a total of 18 populations of bull thistle.

Westfall- JG135, JM-22y, JM-51, PK-09x, TH-02, TH-07, TH-08, SR-112 and SV32: Direct and indirect effects will be the same for in all analysis units for bull thistle. Westfall analysis unit has the most occurrences with eight total known occurrences along proposed motorized trails and roads. The risk of spreading this weed without treatment is moderate as there are many occurrences in this alternative but the relative abundance of this plant in mid-elevation areas on the SNF reduces the impact of these occurrences. With manual treatment, that risk would be reduced to low.

Gaggs- AE34, BP37: Two occurrences with the first (AE34) coupled with an occurrence of Klamathweed and the other by itself. Treatments for the first occurrence would be combined with

mitigations for Klamathweed. Otherwise, treatment methods remain the same as described in the Westfall analysis unit for bull thistle.

Tamarack-Dinkey- JH-104, JH-105 and JH-107: Previously discussed under Alternatives 2 and 4. No change to direct and indirect effects or mitigations from those alternatives under Alternative 5.

Klamathweed

Eight proposed facilities are within 200 ft of eight populations of Klamathweed.

Gaggs- BP112 has one occurrence of Klamathweed. The risk of spread is moderate in the Gaggs area, as there are many areas in the analysis unit that already contain this plant. The risk is associated with spreading this plant along proposed facilities in this alternative not only in Gaggs but other areas of the Forest as well, which increases the risk posed by this plant. Manual control will lower that risk to acceptable levels.

Westfall- JM-14x, JM-38, JM-41, JM-44, SR-36z, SV16, and TH-02: Seven occurrences of Klamathweed are within 200 ft of proposed motorized trails or roads in Alternative 5. This relatively high number of occurrences is more than Alternatives 2 or 4 and so the risk of spread under this alternative is moderate to high when no mitigations are considered. With manual treatment of these occurrences, this risk is lowered to moderately low. As this species is pernicious on the SNF, proposed motorized trails or roads with Klamathweed cannot be completely low risk, even with treatment. The Westfall area contains a large amount of Klamathweed currently and risk of spread within this area is not as high due its prevalence. But many areas of the SNFTS do not have this species in this alternative and are at greater risk of having it establish along those roads or motorized trails. Additionally, the large amount of occurrences needing treatment and then subsequent monitoring would be harder to accomplish effectively due to the relatively high number found.

Gaggs- BP112: Same as above; effects and mitigations would be the same as for Westfall occurrences along motorized trails or roads.

Table 3- 134. Alternative 5 – Unauthorized Routes Added as NFTS Motorized trails

Route	Affected Species	# of Occurrences	Resource Issue	Risk of Spread	Analysis Unit
JG135	Bull thistle	1	NX-1	Moderate	Westfall
JM-14x	Klamathweed	1	NX-1	Moderate to high	Westfall
JM-22y	Bull thistle	1	NX-1	Moderate	Westfall
JM-38	Klamathweed	1	NX-1	Moderate to high	Westfall
JM-41	Klamathweed	1	NX-1	Moderate to high	Westfall
JM-44	Klamathweed	1	NX-1	Moderate to high	Westfall
SV16	Klamathweed	1	NX-1	Moderate to high	Westfall
TH-02	Bull thistle, Klamathweed	1 each	NX-1	Moderate; Moderate to high	Westfall
TH-07	Bull thistle	1	NX-1	Moderate	Westfall
TH-08	Bull thistle	1	NX-1	Moderate	Westfall
AE-34	Bull thistle,		NX-1	Moderate; Moderate to high	Gaggs
BP112	Klamathweed	1	NX-1	Moderate to high	Gaggs
SR-112	Bull thistle	1	NX-1	Moderate	Westfall
SR-36z	Cheatgrass, Bull thistle, Klamathweed	1 each	NX-1	Low; Moderate; Moderate to high	Westfall
SV32	Cheatgrass, Bull Thistle, Yellow starthistle	1 each	NX-1	Low; Moderate; High	Westfall

Table 3- 135. Alternative 5 – Unauthorized Routes Added as NFTS Roads

Route	Affected Species	# of Occurrences	Resource Issue	Risk of Spread	Analysis Unit
JH-104	Bull thistle	1	NX-1	Moderate	Tamarack-Dinkey
JH-105	Bull thistle	1	NX-1	Moderate	Tamarack-Dinkey
JH-107	Bull thistle	1	NX-1	Moderate	Tamarack-Dinkey
JM-51	Bull thistle	1	NX-1	Moderate	Westfall
PK-09X	Bull thistle	1	NX-1	Moderate	Westfall

PROPOSED OPEN AREA ADDITIONS

None of the areas being proposed in Alternative 5 have any known weed issues or concerns and so there are no effects for areas in this alternative for noxious weeds.

Changes to the NFTS (changes to vehicle class, season of use, and opening or closing roads)

It is assumed that changing vehicle class does not change risk of weed spread (see assumptions in section 3.12.1).

Indicator 1 – Overall amount of land base of SNF that would potentially receive use by motor vehicles.

SEASON OF USE (INCLUDING CLOSED YEAR-ROUND)

Effects would be similar to Alternative 2, but because more miles of roads, motorized trails and areas would be open for more months, more opportunities for weed introduction and spread would exist under Alternative 5 than under Alternatives 2, 3 and 4, but less than Alternative 1.

Cumulative Effects

Cumulative effects for Alternative 5 will be greater than those in Alternatives 1, 4 or 2 due to the relative number of noxious weed occurrences- resulting in a higher risk of weed spread. In comparison to Alternative 1, however, Alternative 5 will have a low risk of spreading weeds. Past, present, and reasonably foreseeable future projects for Alternative 5 that contribute to the risk of spread for noxious weeds include fuels treatments, hazard tree sales, road maintenance, and special use projects involving construction or ground-disturbance. Bull thistle has the most infestations near facilities; this may result in some dispersal of bull thistle around the SNFTS if mitigations were not implemented. As bull thistle has already established itself throughout many areas in the SNF, this risk is not as high as it would be for other weeds. Cheatgrass may be slightly affected but it is not considered a moderate or high risk for spread so it will be only a low risk for dispersal. Klamathweed has nine occurrences on proposed facilities under this alternative and coupled with ongoing and future projects on the SNF, moderate cumulative effects from this alternative are possible if mitigation is not implemented. Even with mitigations occurring, this particular species is currently increasing in the SNF (Tuitele-Lewis 2008) and mitigations may only partially reduce the cumulative effect from this alternative. Yellow starthistle occurs along one facility proposed under Alternative 5 (one infestation in the Westfall analysis unit). With the implementation of manual treatment before the facility can be used, cumulative effects would not occur.

Compliance with the LRMP and Travel Management Rule Other Regulatory Direction

Alternative 1

Complies with LRMP and Forest Service Direction concerning noxious weeds?

Alternative 1 contradicts Executive Order 13112 of Feb. 3, 1999 and therefore is not in compliance with SNF and Forest Service direction regarding noxious weeds.

Alternative 2

Complies with LRMP and Forest Service Direction concerning noxious weeds?

Alternative 2 complies with LRMP S&Gs relative to noxious weeds, and therefore is in compliance with SNF and Forest Service direction.

Alternative 3

Complies with LRMP and Forest Service Direction concerning noxious weeds?

Alternative 3 complies with LRMP S&Gs relative to noxious weeds, and therefore is in compliance with SNF and Forest Service direction.

Alternative 4

Complies with LRMP and Forest Service Direction concerning noxious weeds?

Alternative 4 complies with LRMP S&Gs relative to noxious weeds, and therefore is in compliance with SNF and Forest Service direction.

Alternative 5

Complies with LRMP and Forest Service Direction concerning noxious weeds?

Alternative 5 complies with LRMP S&Gs relative to noxious weeds, and therefore is in compliance with SNF and Forest Service direction.

3.13 Terrestrial Wildlife

3.13.1 Introduction

Management of terrestrial species and habitat and maintenance of diversity of animal communities is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands are planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species or lead to a trend toward listing or loss of viability of Forest Service Sensitive species. In addition, management activities are designed to maintain or improve habitat for Management Indicator Species (MIS) to the degree consistent with multiple-use objectives established in each Forest LRMP. Management decisions related to motorized travel can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance and modifying habitat (Gaines et al. 2003, Trombulak and Frissell 2000, USDA-FS 2000b). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife and avoid significant disruption of wildlife habitat while providing for motorized use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to motorized travel on NFS lands must consider effects to wildlife and their habitat.

Analysis Framework: Statute, Regulation, LRMP and Other Direction

Direction relevant to the proposed action as it affects terrestrial biota includes:

Endangered Species Act (ESA)

The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a Federal agency not be likely to jeopardize the continued existence of a threatened or endangered (TE) species or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible Federal agency to consult the USFWS and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE species to ensure management activities are not likely to jeopardize the continued existence of a TE species or result in the destruction or adverse modification of habitat of such species that is determined to be critical. This assessment is documented in a Biological Assessment (BA) and is summarized or referenced in this chapter.

Forest Service Manual and Handbooks (FSM and FSH 2670)

Forest Service Sensitive (FSS) species are species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on National Forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in a Biological Evaluation (BE) and is summarized or referenced in this chapter.

Sierra Nevada Forest Plan Amendment (SNFPA)

The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified the following standards and guidelines applicable to motor vehicle travel management and terrestrial wildlife, which will be considered during the analysis process:

Wetland and Meadow Habitat (Management S&G 70): See Water (Aquatic) Resources section.

California Spotted owl and Northern Goshawk (Management S&G 82): Evaluate proposals for new roads, trails, off-highway vehicle routes and recreational and other developments for their potential to disturb nest sites.

Under the Sierra Nevada Forest Land Management Plan Amendment protected activity centers (PACs) will be established for known and discovered northern goshawks (200 acres) to protect breeding adults and their offspring. Designate northern goshawk PACs based upon the latest documented nest site and location(s) of alternate nests. If the actual nest site is not located, designate the PAC based on the location of territorial adult birds or recently fledged juvenile goshawks during the fledgling dependency period.

Fisher and Marten (Management S&Gs 87 and 89): Evaluate proposals for new roads, trails, off-highway vehicle routes and recreational and other developments for their potential to disturb den sites.

The standard and guideline # 87 for fisher den sites will be implemented which states ‘mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off-highway vehicle route, trail and road uses (including road maintenance). Evaluate proposals for new roads, trails, off-highway vehicle routes and recreational and other developments for their potential to disturb den sites’.

In 2007, the Conservation Biology Institute developed a model predicting the probability of fishers occurring in areas of the southern Sierras (Spencer, et al. 2007). There is a 700 acre buffer fisher den site designation which has been applied to some of the den sites as of August 2009.

Standard and guideline #89 states ‘mitigate impacts where there is documented evidence of disturbance to the den sites from existing recreation, off-highway vehicle route, trail and road uses (including road maintenance). Evaluate proposals for new roads, trails, off-highway vehicle routes and recreational and other developments for their potential to disturb den sites’. No mitigation needs to occur at this time for marten because there are no known marten den sites on the Sierra National Forest.

Riparian Habitat (Management S&G 92): See Water Resources section.

Bog and Fen Habitat (SNFPA ROD page 65, S&G #118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans and wheeled vehicles (See Botanical Resources section for more detail).

The Southern Sierra Fisher Conservation Area

The conservation strategy (SNFPA ROD, USDA-FS 2004a) contains four critical elements for fisher conservation: 1) it provides management direction for the Southern Sierra Fisher Conservation Area to support fisher habitat requirements; 2) it provides for suitable habitat linkages between southern and northern Sierra Nevada fisher populations; 3) it provides protection for all den sites; and 4) it provides suitable habitat for possible fisher reintroductions.

The Southern Sierra Fisher Conservation Area (SSFCA) encompasses the known occupied range of the fisher in the Sierra Nevada. This consists of an elevational band from 3,500 feet to 8,000 feet (errata March 2001e) on the Sierra and Sequoia National Forests. This area will be managed to support fisher habitat consistent with the protections for the California spotted owl.

SNF Land and Resource Management Plan

The LRMP management direction for sensitive species is to develop and implement management practices, referred to as standards and guidelines, to ensure sensitive species do not become threatened or endangered because of Forest Service actions. Under LRMP standards and guidelines, the SNF is to arrange management activities to protect and preserve nests and dens of all sensitive wildlife species until young have dispersed (S&G #53); similarly, LRMP management direction for Federally-listed threatened and endangered species is to manage them according to their recovery plans (USDA-FS 1991). The LRMP Forestwide Goals and Objectives for Threatened, Endangered, Proposed and Sensitive species are:

- Manage fish, wildlife and plant habitats to maintain viable populations of all resident fish, wildlife and plant species.
- Manage habitat for State and Federally-listed threatened and endangered fish, wildlife and plant species to meet the objectives of their recovery plans.
- Emphasize habitat improvement for sensitive, threatened, endangered and harvest species.
- Manage habitat for Forest Service sensitive fish, wildlife and plant species in a manner that prevents any species from becoming a candidate for threatened or endangered status.

There is specific management direction listed here for the goshawk because it identifies information that is unique due to the LRMP direction listed below. This direction is in addition to what is listed in the SNFPA ROD.

- Under LRMP management direction, 55 goshawk territories have been established on the SNF. The LRMP standard and guidelines provide for up to 50 acres of suitable habitat encompassing goshawk nest sites to be managed to benefit goshawks (S&G #56). Additionally, in the Errata to the Record of Decision Final Environmental Impact Statement, LRMP (USDA-FS September 24, 1991a) - Management Standard and Guidelines (Page 1), two guidelines for goshawks were identified. A 50-acre primary zone of older mature forest surrounding the occupied or potential nest site and a secondary zone of 75 acres around the primary zone will have a limited operating season between March 15 and August 15 or a limited operating season based on site specific information. As directed in the LRMP, a network of goshawk territories has been developed on the SNF. The network and guidelines for management of the goshawk territories has been approved by the Forest Supervisor (USDA-FS 1997). For each goshawk territory, these guidelines call for managing 175 contiguous acres to benefit the goshawk.

Effects Analysis Methodology

The species assessment presented here is organized by Species Groups divided along major habitat associations or life zones. Projected effects of motor vehicle travel management on sets of species in these major groupings are described. In addition, individual species assessments are presented for Federally-listed species, Forest Service Sensitive Species and Management

Indicator Species (Table 3- 136). More detailed information is also found in the Biological Assessment/Evaluation for Motorized Travel Management (Sorini-Wilson, 2010) and Project Management Indicator Species report, SNF (Strand and Sanchez 2010) and are incorporated by reference.

This assessment consists of 4 steps: (1) identify wildlife species and groups; (2) identify roads, motorized trails, and Open Areas associated factors for each group; (3) develop and apply assessment processes and GIS models to evaluate the influence of roads, motorized trails and Open Areas associated factors on each group; and (4) analyze the effects of the proposed alternatives based on the model outputs and analyses.

Table 3- 136. Identify Wildlife Special Status Species on the SNF

Species	Federally Listed Threatened/ Endangered	Forest Service Sensitive	Management Indicator Species (MIS)	Category for Project Analysis*	California Wildlife Habitat Relationships (CWHR)	Habitat	Distribution on SNF and in the Project Area
Fresno kangaroo rat	X					The nearest habitat is found in the southwestern portion of the San Joaquin Valley.	Project area is above elevational limit for species.
Sierra Nevada bighorn sheep	X					East slope of the Sierra Nevada's on the Inyo NF at Wheeler Crest, Mt Baxter and Mt Williamson. Found in mountainous habitat containing rolling meadows and plateaus in proximity to steep rocky terrain, often w/80% slopes on southerly aspects.	Project area is not habitat
California condor	X					Open terrain and roost on cliffs and large trees.	Project area is not habitat
Valley elderberry longhorn beetle	X					Elderberry shrubs; covered under programmatic consultation	There is habitat within the project area.
Bald eagle		X				Mature conifer forest near large bodies of water	Nests near large reservoirs across the Forest

Species	Federally Listed Threatened/ Endangered	Forest Service Sensitive	Management Indicator Species (MIS)	Category for Project Analysis*	California Wildlife Habitat Relationships (CWHR)	Habitat	Distribution on SNF and in the Project Area
Peregrine falcon		X				On SNF known or suspected eyries occur along or near the North and South Kings River, San Joaquin River and Merced River. Requires protected cliffs and ledges for cover.	Vehicles will not be travelling or disturbing suitable habitat
California spotted owl		X	X	3	6, 5D, 5M, 4D, 4M ***	Late Seral Closed Canopy Coniferous Forest; Mature and late-successional conifer forest	Suitable habitat across Forest.
American marten		X	X	3	6, 5D, 5M, 4D, 4M ***	Late Seral Closed Canopy Coniferous Forest	Suitable habitat across Forest.
Pacific fisher		X			5D, 4D**	Mature and late-successional conifer forest	Suitable habitat across Forest; known den sites
California wolverine		X				Areas of low human disturbance such as caves, hollows in cliffs, logs, rock outcrops and burrows for cover.	Suitable habitat on Forest. No known or verified sightings since 1930s. Habitat not affected by the project because there are no roads and motorized trails in this type of habitat.

Species	Federally Listed Threatened/ Endangered	Forest Service Sensitive	Management Indicator Species (MIS)	Category for Project Analysis*	California Wildlife Habitat Relationships (CWHR)	Habitat	Distribution on SNF and in the Project Area
Sierra Nevada red fox		X				Mature subalpine conifer forest and riparian/montane meadow; dense vegetation and rocky areas, In the Sierra Nevada, prefers forests interspersed with meadows or alpine fell-fields. On the SNF, habitat exists primarily in wilderness.	Suitable habitat on Forest. Habitat not affected by the project.
Northern goshawk		X			4D, 4M, 5D, 5M	Late Seral Closed Canopy Coniferous Forest	Forestwide
Great gray owl		X			5D, 5M, 6	Mature and late-successional conifer forest adjacent to meadows	Suitable habitat across Forest.
Willow flycatcher		X				Riparian shrub (willow) and wet meadow	Specific mdws; 9 known occupied sites according to Framework
Western red bat		X				Riparian habitat and hardwoods within riparian areas; roosts within tree foliage or shrubs and often along edge habitat adjacent to streams or open fields (Bolster 1998)	Habitat is generally below 3000 feet in elevation
Pallid bat		X				Affinity for oak and mixed hardwood conifer, Roost sites can include buildings, mines, caves and live oak trees and oak snags.	Habitat is generally below 10,000 feet in elevation

Species	Federally Listed Threatened/ Endangered	Forest Service Sensitive	Management Indicator Species (MIS)	Category for Project Analysis*	California Wildlife Habitat Relationships (CWHR)	Habitat	Distribution on SNF and in the Project Area
Townsend's big-eared bat		X				Cave and mine dependent	Habitat is generally below 6000 feet in elevation
Fox sparrow			X	3		Shrubland (west-slope chaparral types)	
Mule deer			X	3		Early to intermediate successional stages of most forest, woodland, and brush habitats ***	
Yellow warbler			X	3		Riparian. (May also breed in montane chaparral and open canopy coniferous forest habitat). ***	
Mountain quail			X	3		Early and Mid Seral Coniferous Forest. Found particularly on steep slopes in open, brushy stands of conifer and deciduous forests and woodlands, and in chaparral. ***	
Blue grouse			X	3		Late Seral Open Canopy Coniferous Forest	
Northern flying squirrel			X	3		Late Seral Closed Canopy Coniferous Forest	
Hairy woodpecker			X	3		Snags in Green Forest	
Black-backed woodpecker			X	2		Snags in Burned Forest	

*The column marked 'category for project analysis' is only for MIS species/habitat. The categories are as follows: Category 1: MIS whose habitat is not in or adjacent to the project area and would not be affected by the project; Category 2: MIS whose habitat is in or adjacent to project area,

but would not be either directly or indirectly affected by the project; Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

Habitat is based on CWHR Version 8.1 (Modified) and current research. All CWHR size classes and canopy closures are included unless otherwise specified; **dbh = diameter at breast height; **Canopy Closure classifications:** S= Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); **Tree size classes:** 1 (Seedling)($<1''$ dbh); 2 (Sapling)($1''$ - $5.9''$ dbh); 3 (Pole)($6''$ - $10.9''$ dbh); 4 (Small tree)($11''$ - $23.9''$ dbh); 5 (Medium/Large tree)($\geq 24''$ dbh); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

***The CWHRs and habitats listed above define the habitat primarily utilized for reproduction and foraging by the species. They differ from those defined in the MIS Report for some species (discussed below) because the MIS Report focuses on defining a specific habitat type versus defining the habitat utilized by a wildlife species. The MIS Report does not include the 4D and 4M CWHR size and density classes for the California spotted owl and American marten since it focuses on defining the late-seral closed canopy habitat type. While the mule deer utilizes various habitat types, it serves as an MIS only for the oak-associated hardwood and hardwood/conifer habitat type in the MIS Report. The MIS Report focuses on the riparian habitat utilized by the yellow warbler, and on the early and mid seral coniferous forest habitats utilized by the mountain quail and not on other habitats that may be utilized by these two species.

Based on the information presented in Table 3- 136, there will be no direct or indirect effects to the following species, and these species will not be addressed further in this document: Fresno kangaroo rat, Sierra Nevada bighorn sheep, California condor, peregrine falcon, and black-backed woodpecker.

There will be no direct or indirect effects to wolverine or Sierra Nevada red fox because their habitat is not being impacted with this project; therefore, these species will not be addressed further in this document. The Sierra Nevada red fox uses dense vegetation and rocky areas which pertain to a portion of the wilderness. There are no unauthorized routes or proposed facilities in the wilderness; therefore, the habitat is not being impacted.

Wolverine habitat as described by Zeiner et al (1990) is areas of low human disturbance such as caves, hollows in cliffs, logs, rock outcrops and burrows for cover. They den in similar habitat. There are no roads and motorized trails in this type of habitat and there have been no verified sightings since the 1930s; therefore, the habitat is not being impacted.

Assumptions Specific to the Terrestrial Biota Analysis

1. All vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type.
2. Location of roads and motorized trails is equal to disturbance effects from use (i.e., assume all roads and motorized trails provide the same level of disturbance), unless local data or knowledge indicate otherwise.
3. Habitat effectiveness and suitability is negatively impacted in the short term. In the long term, habitat effectiveness and quality will not change on or near added roads and motorized trails, but will increase to at least some degree due to subsequent passive restoration on or near unauthorized roads and motorized trails that are not added to the NFTS.
4. Open Areas include cross-country areas that are open to all vehicles, parking areas that are open to 'highway-legal vehicles only,' and staging areas that are open to 'highway-legal vehicles only.' Of the three types of those open to all vehicles tend to have the highest level of impact. To be conservative, all three types will be analyzed as if they were open to all vehicles and analyzed for the highest level of impact. As such, the three different types of areas will not be analyzed separately. Throughout the remainder of this report, they will be cumulatively referred to as Open Areas or areas.

Data Sources

1. GIS layers with the following information: roads and motorized trails; habitats; and 'designated' or important wildlife areas.
 - The following GIS layers were used to assess effects of the road, motorized trails and areas proposed to be added to the NFTS: California spotted owl protected activity centers (PACs) and Home Range Core Areas (HRCAs), along with known nest sites, territorial pairs and individual sightings; goshawk PACs and territories; great gray owl PACs; Deer Population Centers, Holding Areas, Winter Range and Migration routes; FAUNA database of incidental sightings for TES species; and past survey results.
 - To determine suitable habitat, the vegetation layer used is a combination of 1997 and 2001 vegetation layers. The combination of the 1997 and 2001 layers was implemented because it was determined by resource managers that the 1997

vegetation was more accurate regarding density for mixed conifer in the elevations roughly 5000 feet and above and the 2001 vegetation layer was more accurate for the elevation 5000 feet and below, for Ponderosa pine (developed for the SNF by the USDA Remote Sensing Lab). Meadow and plantation data were also embedded in the suitable habitat vegetation layer used for this project analysis.

2. Site specific surveys and assessment of any localized sensitive wildlife habitats where roads and trails were proposed to be added to the NFTS. The analysis of the alternatives was based on consideration of the best available science, including applicable peer-reviewed studies and local data.

Northern goshawk surveys were conducted according to Survey Methodology for Northern goshawks in the Pacific Southwest region, Forest Service (USDA, 2002a); California spotted owls were surveyed according to Protocol for Surveying for California spotted owls in proposed management areas and habitat conservation areas (USDA, 2006) and Pacific Southwest Research Stations method; great gray owl surveys were conducted using survey protocol for the great gray owl in the Sierra Nevada of California, May 2000 (Beck and Winter 2000); furbearer surveys have been conducted by Pacific Southwest Research station and UC Berkeley using survey methods that are a mix of baited camera stations, hair snares, scat dogs and tracking radio-collared individuals.

Field visits were also conducted when reconnaissance through GIS suggested further field data was needed. When visiting proposed facilities, field data was recorded for habitat type, canopy cover and suitability of wildlife habitat. Details of field visits and forms are available and are on file at the High Sierra Ranger District, wildlife biology office.

Terrestrial Biota Measurement Indicators

- Acres open to motorized use and miles of unauthorized routes and Open Areas within terrestrial biota habitat.
- Density of roads and motorized trails at the 6th field watershed level.
- Miles of roads and motorized trails at forestwide scale and within the habitat for each species group.
- Number of sensitive sites for Threatened, Endangered and Sensitive (TES) species (e.g., Protected Activity Core [PACs], nest sites, winter roost areas) within ¼ mile of an added roads and motorized trails or Open Area.
- The proportion of a species (or species group) habitat that is affected by motorized roads, motorized trails and Open Areas.

Terrestrial Biota Methodology by Action

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Ten analysis units, wilderness excluded because motorized use is not allowed.

Indicator(s): Acres open to motorized use and miles of unauthorized routes within terrestrial biota habitat.

Methodology: GIS analysis of existing unauthorized routes in relation to habitat.

Rationale: Studies have documented that motorized travel can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance and modifying habitat (Gaines et al. 2003, Trombulak and Frissell 2000, USDA-FS 2000).

2. Direct and indirect effects of adding facilities (roads, motorized trails and/or Open Areas) to the NFTS, including identifying seasons of use and vehicle class.

Considerations: Display information related to indicators in tabular form (indicators by alternatives).

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Ten analysis units, wilderness excluded because motorized use is not allowed.

Indicator(s): (1) Density of motorized roads and motorized trails; (2) Miles of motorized roads and motorized trails; (3) Number of sensitive sites for TES species (e.g., PACs, nest sites, winter roost areas) within ¼ mile of an added roads and motorized trails or Open Areas; (4) The proportion of a species (or species group) habitat that is affected by motorized roads and motorized trails.

Methodology: GIS analysis of added facilities in relation to habitat and important/sensitive terrestrial biota areas.

Rationale: Literature indicates that placement of motor vehicle facilities in relation to habitat can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance and modifying habitat (Gaines et al. 2003, Trombulak and Frissell 2000, USDA-FS 2000).

3. Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads).

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Ten analysis units, wilderness excluded because motorized use is not allowed.

Indicator(s): (1) Density of roads and motorized trails; (2) Miles of roads and motorized trails; (3) Number of sensitive sites for TES species (e.g., PACs, nest sites, winter roost areas) within ¼ mile; (4) The proportion of a species (or species group) habitat that is affected by motorized facilities.

Methodology: GIS analysis of NFTS changes in relation to habitat and important and sensitive terrestrial biota areas.

Rationale: Literature indicates that location of motorized facilities in relation to habitat can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance and modifying habitat (Gaines et al. 2003, Trombulak and Frissell 2000, USDA-FS 2000).

4. Non-Significant LRMP Amendments

As explained in section 3.1.1, the non-significant LRMP amendments do not have effects to wildlife species or habitat (including MIS habitat). The amendment changing the language of S&G 17 pertaining to the management of ML1 roads updates the direction of the LRMP

to be consistent with national direction. The potential for impacts to wildlife species or habitat have been analyzed under Action 3, Changes to the NFTS. The amendment change ROS class has no relevance to wildlife species or habitat. The facilities proposed to be added to the NFTS within the ROS class area have been analyzed under Action 2, Additions to the NFTS. Therefore, the environmental consequences of these amendments will not be discussed further in the wildlife resources section.

5. Cumulative Effects

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long term timeframe.

Long-term timeframe: 20 years.

Spatial boundary: SNF, excluding wilderness because motorized use is not allowed.

Indicator(s): (1) Density of roads and motorized trails; (2) Miles of roads and motorized trails; (3) Number of sensitive sites for TES species (e.g., PACs, nest sites, winter roost areas) within ¼ mile of an added roads and motorized trails or Open Area; (4) The proportion of a species (or species group) habitat that is affected by motorized roads and motorized trails (see Aquatic Biota section for discussion of fish, amphibian and reptile species).

Methodology: GIS analysis of past/current, added and future roads and motorized trails/Open Areas in relation to habitat and important and sensitive terrestrial areas and in context of other past/current and future management actions affecting terrestrial habitat.

Rationale: Literature indicates that placement of motorized facilities in relation to habitat can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance and modifying habitat (Gaines et al. 2003, Trombulak and Frissell 2000, USDA-FS 2000).

3.13.2 Affected Environment and Environmental Consequences

First, the affected environment will be discussed for wildlife groups and species, followed by the environmental consequences for wildlife groups and species. Each group will be analyzed for the effects of each alternative against the indicators. Any species specific effects will also be discussed.

Affected Environment – General Wildlife

On the SNF the following habitat types exist in the project area: oak woodland, shrubland, riparian, meadow, Ponderosa pine, Jeffrey pine, incense cedar, Sierra mixed conifer, white fir, red fir and finally juniper at the higher elevations. There is suitable seasonal or year-round habitat for about 346 vertebrate species including 31 species of fish, 13 species of amphibians, 22 reptiles (see Aquatics Biota section for fish, amphibians and reptile analysis), 198 birds and 82 mammals. There are currently four species listed as Endangered or Threatened under the Endangered Species Act (ESA) and thirteen species listed as Forest Service Sensitive. These species and their habitats on the SNF are described in detail in the SNF Motorized Travel Management EIS Biological Evaluation/Biological Assessment (BE/BA) (incorporated by reference) (Sorini-Wilson, 2010). In addition there are 12 Management Indicator Species (MIS) habitats or ecosystem components. Only eight will be discussed in this section because wet meadow and riverine and lacustrine are covered under the aquatics section. Sagebrush habitat is not identified for this forest and there are currently no snags in burned forest habitat within the project analysis

area. These eight habitats and species associated with them are described in detail in the SNF Motorized Travel Management MIS Report (Strand and Sanchez 2010) (also incorporated by reference).

USFWS Endangered Species

Fresno kangaroo rat	<i>Dipodomys nitratooides exilis</i>
Sierra Nevada bighorn sheep	<i>Ovis canadensis californiana</i>
California condor	<i>Gymnogyps californianus</i>

The endangered species listed above have been identified by the USFWS as within Fresno, Madera or Mariposa county but are not within the project area, therefore, they will not be addressed further in this document. Unless otherwise noted, no further consultation on these species pursuant to the Endangered Species Act of 1973 is required with the Fish and Wildlife Service for these particular activities, unless new information reveals effects of the proposed action not considered here.

USFWS Threatened Species

Valley elderberry longhorn beetle	<i>Desmocerus californicus dimporphus</i>
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There is habitat for the Valley elderberry longhorn beetle within the project area. Therefore, the project will follow the Project Design Criteria for Valley elderberry longhorn beetle as outlined in the "Route Designation Project Design Criteria for 'No effect' or 'May affect Not Likely to Adversely Affect' determinations (October 2006)." The U.S. Fish and Wildlife Service has concurred with the determination of May Affect Not Likely to Adversely Affect when the Project Design Criteria are followed (see project record).

Forest Service Sensitive Species

The following ten species are within the project area and are discussed (along with habitat requirements and effects) in this document. The 1998 Forest Service Sensitive Species list has been updated six times since 1998.

Bald eagle	<i>Haliaeetus leucocephalus</i>
California spotted owl	<i>Strix occidentalis occidentalis</i>
American marten	<i>Martes americana</i>
Pacific fisher	<i>Martes pennanti pacifica</i>
Northern goshawk	<i>Accipiter gentiles</i>
Great gray owl	<i>Strix nebulosa</i>
Willow flycatcher	<i>Empidonax traillii</i>
Western red bat	<i>Lasiurus blossevillii</i>
Pallid bat	<i>Antrozous pallidus</i>
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>

Forest Service Management Indicator Species

The ten habitat types, along with the associated management indicator species, are within the project area and are discussed (along with habitat impacts) in this document (8 in this section and 2 in Aquatic Biota section). The Forest Service Management Indicator Species (MIS) list (2007) for the SNF is a representation of habitat and species associated with those habitats. The MIS species are listed in Table 3- 136.

Affected Environment Related to Current Motorized Use

Some of the threatened, endangered and sensitive species and habitat for MIS are currently being affected by cross-country motorized use of the SNF. Literature describing the effects of roads and motorized trails upon wildlife have often grouped or categorized species in various ways to describe effects (Knight and Gutzwiller, ed. 1995, Gaines et al. 2003, Wisdom et al 2000). Gaines et al. (2003) categorized species into the following five groups (Table 3- 138) based upon a combination of their biology and interactions with road- and motorized trail-associated factors: (1) old forest associated (or late-successional forest associated) ;(2) wide ranging carnivores species; (3) ungulates (oak-woodland and oak conifer); (4) riparian-associated species; and (5) cavity dependent species. MIS habitats are addressed under the five categories where appropriate. Those habitats that don't fit into a category will be addressed at the end of the chapter. A summary of the types of road- and trail-associated effects is presented in Table 3- 137.

Table 3- 137. Road and Trail Associated Factors with Disturbance and Activity Type and Affected Wildlife Group

Road and Trail – Associated factors ¹	Activity Type ²	Definition of Associated Factors	Wildlife Group Affected
Collisions	Harvest	Mortality or injury resulting from a motor vehicle running over or colliding with an animal	<ul style="list-style-type: none"> • Wide-ranging carnivores • Late successional species • Aquatic-Riparian species • Ungulates
Habitat loss and fragmentation	Habitat modification	Loss and resulting fragmentation of habitat due to the establishment of roads, trails or networks and associated human activities	<ul style="list-style-type: none"> • Wide-ranging carnivores • Late successional species • Aquatic-Riparian species • Ungulates
Edge effects	Habitat modification	Changes to habitat microclimate associated with the edge induced by roads or trails	<ul style="list-style-type: none"> • Late successional
Snag or downed log reduction	Habitat modification	Reduction in density of snags and down logs due to their removal near roads as facilitated by road access	<ul style="list-style-type: none"> • Wide-ranging carnivores • Late successional species • Snag dependent species

Road and Trail – Associated factors ¹	Activity Type ²	Definition of Associated Factors	Wildlife Group Affected
Route for competitors and predators	Habitat modification	A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise	<ul style="list-style-type: none"> • Wide-ranging carnivores • Late successional • Aquatic -Riparian species
Disturbance at a specific site	Disturbance	Displacement of individual animals from a specific location that is being used for reproduction and rearing of young	<ul style="list-style-type: none"> • Wide-ranging carnivores • Late successional • Aquatic-Riparian associated • Ungulates • Oak-associated • Snag-dependent species
Physiological response	Disturbance	Increase in heart rate or stress hormones when near a road or trail or network of roads or trails	<ul style="list-style-type: none"> • Ungulates • Late successional • Aquatic-Riparian associated • Wide-ranging species • Oak-Associated • Snag-dependent

¹ Based in part on Wisdom et al. 2000 in: Gaines et al. 2003

² Disturbance occurs when an animal sees, hears, smells or otherwise perceives the presence of a human but no contact is made and it may or may not alter its behavior. Habitat modification is when habitat is changed in some way. Harvest involves human actions in which there is direct and damaging contact with the animal.

Table 3- 138 displays the wildlife groups and the associated species representatives that will be discussed in the EIS.

Table 3- 138. Wildlife Group and Species Represented Within Groups

Wildlife Group	Species ¹
Late-successional forest associated species	California spotted owl, northern goshawk, great gray owl, American marten, Pacific fisher, northern flying squirrel*, blue grouse*
Wide-ranging carnivores	Mule deer
Ungulates (Oak-woodland and oak-conifer associated species)	Bald eagle, great gray owl, willow flycatcher, yellow warbler*, Western red bat, Townsend's big eared bat
Riparian-associated species	Pallid bat, hairy woodpecker**, Townsend's big-eared bat
Cavity-dependent species	California spotted owl, northern goshawk, great gray owl, American marten, Pacific fisher, northern flying squirrel*, blue grouse*

¹ *Some of the species that are listed in the wildlife group will be addressed in the MIS section of this chapter, under the applicable MIS habitat or ecosystem component. Further detail is available in the MIS Report (Strand and Sanchez 2010), which can be found in the project record.

Zone Of Influence

It is important to keep in mind that impacts from roads and motorized trails vary significantly depending on the purpose, type, width, length, location (ridgetop, mid slope, bottom), type and amount of maintenance, and developmental stage (newly constructed, maintained, decommissioned, abandoned). Geology, topography, and climate play an important role in road stability and impact, as does the degree and type of interaction with stream networks (USDA 2003a). Degree of impact also depends upon road/trail density (USDA FS 2000). Therefore, caution must be taken when generalizing about the environmental effects of a road or motorized trail.

It is also important to determine the effective width, or zone of influence, of a road or motorized trail before determining the degree of impact upon wildlife. One must consider: (1) not only the width of the road or trail itself, but also (2) the area disturbed by construction (i.e. road banks), and (3) the distance that wildlife is disturbed and/or habitat use is modified or avoided (USDA FS 2000). The distance that an animal must be from a road or trail to remain undisturbed or behaviorally unmodified by it depends on the species. Many of the studies have focused on species that do not occur on the SNF (such as elk, grizzly bear, gray wolf, big horn sheep, and northern spotted owl); however, they can be used to provide a general idea of the degree and diversity of road effects upon wildlife. There is a table displayed in the MIS report (Strand and Sanchez 2010) showing the species, distance of displacement/impact, road density impacts and the references.

The zone of influence (ZOI) for the species discussed in this analysis is ¼ mile on either side of center line (1/2 mile corridor) around existing and proposed additions to the NFTS (USDA 2003a). The effects to wildlife extend beyond the immediate road prism itself, into what can be referred to as a zone of influence adjacent to motorized roads, trails and areas (facilities). Motorized facilities have a zone of influence within which habitat effectiveness or suitability is reduced and wildlife population densities are lower (Trombulak and Frissell 2000, Gaines, et al. 2003). The degree of effect of the various factors associated with roads and trails can be evaluated more effectively when considering the proportion of a given species habitat that occurs within this zone of influence (as applied using GIS analysis). The zone of influence is a relative index of habitat effectiveness used to compare alternatives (see Indicator #4).

The ¼ mile ZOI should cover a large enough area to encompass habitat taken out of effective use in highly motorized Open Areas where disturbance to wildlife has the potential to be the greatest. Beyond the ¼ mile ZOI, it is likely that there would be enough vegetative screening to decrease an animal's sensitivity to disturbance, thereby permitting the animal to effectively use habitat beyond that point.

Affected Environment – by Terrestrial Biota Indicator

The SNF Motorized Travel Management (MTM) Project proposes to: (1) prohibit cross-country travel; (2) add some roads and motorized trails to the NFTS; (3) make changes to the NFTS including changing seasonal open period and vehicle class on some NFTS roads and motorized trails and; (4) make non-significant LRMP amendments (Note: The analysis of aquatic wildlife habitats (Lacustrine/Riverine and Meadow Habitats) are covered under the aquatics section of this document.

Table 3- 139 below shows the existing condition and proposed changes for the Travel Management FEIS. The comparison between alternatives and direct and indirect effects are based on these numbers. Changes to vehicle class and non-significant changes to the LRMP do not affect terrestrial wildlife (as previously explained) and, thus, are not reflected in the table.

Table 3- 139. Differences between Alternatives in Allowable Motorized Use within the Analysis Area

	Acres Open to Motorized Cross-country Travel	Number and Acres of unauthorized Open Areas that Can Receive Motorized Use Under Allowable Cross-Country Travel	Number and Acres of FS Managed Open Areas	Miles of Unauthorized Routes that Can Receive Motorized Use Under Allowable Cross-Country Travel	Miles of NFTS Roads and Motorized Trails (miles of roads and motorized trails added to the NFTS that are included in total)	Miles of NFTS Roads and Motorized Trails with Seasonal Closures (changes in seasonal closures)	Miles of NFTS Roads and Motorized Trails Closed to Vehicles Year-round (changes in year-round closures)	Miles and Density of All Motorized Facilities in Analysis Area (1) Miles Density
Alt.1	605,000	2900 consisting of 965 acres	59 consisting of 124 acres open to OHV	552	2,504 (+0)	470 (+0)	236 (+0)	3,530 2.82
Alt.2	0	0	60 consisting of 131 acres open to OHV use	0	2,548 (+44)	986 (+516)	446 (+210)	3,016 2.41
Alt.3	0	0	59 consisting of 124 acres open to OHV	0	2,504 (+0)	470 (+0)	236 (+0)	2,972 2.38
Alt.4	0	0	70 consisting of 161 acres open to OHV use	0	2,555 (+51)	1,568 (+1,098)	418 (+182)	3,023 2.42
Alt.5	0	0	79 consisting of 232 acres open to OHV use	0	2,589 (+85)	1,625 (+1,155)	418 (+182)	3,057 2.45

(see next page for key)

NFTS =National Forest Transportation System

(1) Density calculations provided in the last column include: (1) all NFTS roads and motorized trails including those that are closed year-round and seasonally closed; (2) private roads maintained by residents, Southern California Edison (SCE) or Pacific Gas and Electric (PG&E); (3) roads maintained by County, State, National Parks, Bureau of Land Management and other Federal Agencies; and (4) For Alternative 1 ONLY, unauthorized routes that will continue to receive use under allowable motorized cross-country travel.

Table 3- 140. Acres and Percent Terrestrial MIS Habitat Impacted by Motorized Travel by each Alternative.

	Shrubland Habitat	Montane Hardwood Habitat	Riparian Habitat	Early Seral Coniferous Forest Habitat	Mid Seral Coniferous Forest Habitat	Late Seral Open Canopy Coniferous Forest Habitat	Late Seral Closed Canopy Coniferous Forest Habitat	Green Forest Snag Habitat
Alt.1	32,297 (64%)	150,928 (74%)	198 (75%)	40,642 (100%)	265,455 (86%)	1,320 (63%)	54,451 (82%)	149,643 (40%)
Alt.2	19,428 (38%)	91,013 (45%)	178 (67%)	24,992 (62%)	163,864 (53%)	879 (42%)	32,593 (49%)	128,393 (34%)
Alt.3	21,953 (43%)	101,671 (50%)	177 (67%)	26,460 (66%)	185,015 (60%)	1,036 (49%)	37,513 (57%)	126,157 (34%)
Alt.4	18,575 (37%)	79,819 (39%)	160 (61%)	22,767 (56%)	152,699 (50%)	847 (40%)	30,346 (46%)	128,881 (34%)
Alt.5	21,210 (42%)	93,038 (46%)	170 (64%)	28,146 (70%)	184,593 (60%)	978 (47%)	36,375 (55%)	130,623 (35%)

Environmental Consequences – General

For the no action alternative, direct and indirect effects focus on unauthorized routes that will likely continue to receive public motorized use under continued cross-country travel. For the action alternatives, direct and indirect effects focus on roads and motorized trails added to the NFTS in that alternative. Effects related to proposed changes to the NFTS are addressed under each alternative for each species or habitat component.

Table 3- 141 lists the design features that will be implemented with each alternative. The determinations for threatened, endangered and Forest Service sensitive species are made based on these being implemented. The design features have been incorporated into the season of use applied to each facility (see Appendix A).

Table 3- 141. Design Features for Terrestrial Biota

Resource Issue Code	Title	Design Features
WL-1	Noise disturbance to territorial or nesting goshawks.	Seasonal closure from Feb 15-Sept 15. Consult with district biologist to determine if nesting is occurring or surveys need to be conducted.
WL-2	Noise disturbance to territorial or nesting California spotted owl	Seasonal closure from Mar 1- Aug. 15. Consult with district biologist to determine if nesting is occurring or surveys need to be conducted.
WL-3	Noise disturbance to territorial or nesting Great Gray owls	Seasonal closure from Mar 1- Aug. 15. Consult with district biologist to determine if nesting is occurring or surveys need to be conducted.
WL-4	Noise disturbance to deer in holding areas	Seasonal closures for: -Deer holding areas above 5,000 feet elevation – May 15 to June 15 and October 1 through November 30. -Deer holding areas below 5,000 feet elevation – May 1 to June 1 and October 15 to November 30.
WL-5	Noise disturbance to deer in winter ranges	Seasonal closures in deer winter range from December 1 through April 30

Road, Motorized Trail and Unauthorized Route Density

The table below shows the road, motorized trail and unauthorized route density (including unauthorized routes in Alternative 1) (mi/sq. mi.) by alternative within the analysis area. The density includes all jurisdictions on forest (BLM, County, Forest Service, Private, State and SCE). The difference between Table 3- 142 and Table 3- 143 is that all the analysis area does not necessarily fall into a MIS vegetation type.

Table 3- 142. Road, Motorized Trail and Unauthorized Route Density in the Project Area by Alternatives including all Jurisdictions

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
2.82 mi/sq. mi.	2.41 mi/sq. mi.	2.38 mi/sq. mi.	2.42 mi/sq. mi.	2.45 mi/sq. mi.

Table below shows the road density within MIS vegetation type separated by roads, motorized trails and unauthorized routes.

Table 3- 143. Road, Motorized Trail and Unauthorized Route Density in MIS Habitat Types by Alternatives Including all Jurisdictions

Vegetation Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Shrubland Motorized Routes	2.39 mi/sq. mi.	2.04 mi/sq. mi.	2.04 mi/sq. mi.	2.06 mi/sq. mi.	2.08 mi/sq. mi.
Oak-associated Hardwood and Hardwood/conifer Motorized Routes	2.16 mi/sq. mi.	1.84 mi/sq. mi.	1.81 mi/sq. mi.	1.83 mi/sq. mi.	1.87 mi/sq. mi.
Riparian Motorized Routes	3.78 mi/sq. mi.	3.66 mi/sq. mi.	3.66 mi/sq. mi.	3.66 mi/sq. mi.	3.66 mi/sq. mi.
Early Seral Coniferous Motorized Routes	4.60 mi/sq. mi.	3.95 mi/sq. mi.	3.83 mi/sq. mi.	3.94 mi/sq. mi.	4.00 mi/sq. mi.
Mid Seral Coniferous Motorized Routes	3.09 mi/sq. mi.	2.73 mi/sq. mi.	2.69 mi/sq. mi.	2.74 mi/sq. mi.	2.76 mi/sq. mi.
Late Seral Open Canopy Coniferous Motorized Routes	2.50 mi/sq. mi.	2.33 mi/sq. mi.	2.33 mi/sq. mi.	2.33 mi/sq. mi.	2.33 mi/sq. mi.
Late Seral Closed Canopy Coniferous Motorized Routes	2.70 mi/sq. mi.	2.40 mi/sq. mi.	2.38 mi/sq. mi.	2.40 mi/sq. mi.	2.43 mi/sq. mi.

Calculations for Alternative 1 include existing unauthorized routes because use of these routes can be assumed to continue as part of continued cross-country travel.

Direct and Indirect Effects – General for Terrestrial Biota

In recent years, the increasing demand for motorized recreational opportunities on National Forest System lands has led to controversy over the potential effects of this use on wildlife. Several scientific papers and literature reviews have been written on the interaction between the motorized roads and trails on terrestrial and aquatic wildlife species. The majority of the literature and reviews describe the interactions between wildlife and roads rather than wildlife and trails. Most of the research has focused on wide-ranging carnivores and ungulates (e.g., mule deer). Most commonly, interactions included displacement and avoidance where animals were reported as altering their use patterns in response to roads. Disturbance at specific sites are also commonly reported, such as disruption at breeding or wintering sites. Collision with vehicles is another common report. Edge effects and habitat fragmentation, especially in regard to late-successional forests, is another commonly identified impact of roads. The broad general impacts of wheeled motorized roads and trails to wildlife species are summarized here (Trombulak and Frissell 2000). Details and research citations are available in Terrestrial BE/BA (Sorini-Wilson 2010).

- Increased terrestrial species mortality from collision with vehicles
- Modification of animal behavior
- Alteration of the terrestrial habitat
- Increased alteration and use of habitats by humans

Mortality from Collision with Vehicles

Animal mortality or injury from collision with vehicles is well documented in the literature. Trombulak and Frissell (2000) reported animal mortality from vehicle collisions included a wide array of wildlife including deer, wolves, bear, hawks, owls, songbirds, snakes, lizards and amphibians. Road associated mortality generally increases as traffic volume and speed increases. For large mammals, unpaved forest roads pose less of a concern for mortality or injury from vehicle related collisions. Raptors may also be vulnerable to collisions from forest roads and trails because of their foraging behavior (Loos and Kerlinger 1993); however, the most reports of raptor mortality are in association with paved roads and highways.

Road and motorized trail corridors may act as habitat sinks for wildlife that are attracted to corridors (Jalkotzy et al. 1997). Direct mortality of animals from vehicle collisions has been documented primarily in relation to paved roads and highways. Little scientific information is available about vehicle collisions on Forest roads or motorized trails, though some mortality from use of forest roads and motorized trails is to be expected depending on the type of trail and the amount of use a trail receives.

Modification of Animal Behavior

A road or trail may modify the behavior of animals positively or negatively. Behavior modifications include changes or shifts in home range, changes in movement patterns, loss of reproductive success, flight or escape response and changes in physiological condition. Some wildlife species are more sensitive to well-traveled roads as opposed to motorized roads and motorized trails that are only used by high clearance four-wheel drive, motorcycle and all-terrain vehicles (ATVs). Other wildlife is more sensitive to the latter. In general, all roads and motorized trails, depending on the type of vehicle and the amount of use, have some type of positive or negative impact on wildlife.

The most common interaction identified in literature between roads and motorized trails and wildlife species was displacement and avoidance, which altered habitat use (Kasworm and Manley 1990, Mace et al. 1996 *In*: Gaines et al. 2003). Wildlife often avoid habitats in the vicinity of roads because of repeated disturbances along the corridor (Jalkotzy, et al. 1997). Studies indicated both black bears and grizzly bears shifted their home ranges away from areas of high road density to areas of lower road densities (Brody and Pelton 1989, McLellan and Shackelton 1988). Road avoidance may vary seasonally. Both grizzly and black bears tended to avoid roads less in the spring than in the fall. Elk also avoided roads less in the spring and more in the fall.

Roads may affect the reproductive success of some species. Bald eagles in Oregon and Illinois showed declines in nesting productivity with the closer proximity to roads. Bald eagle nests were preferentially selected away from roads (Trombulak and Frissell 2000).

Havlick (2002) documented numerous studies that show wildlife, including birds, reptiles and large ungulates respond to disturbance with accelerated heart rate and metabolic function and suffer from increased levels of stress. These factors can lead to displacement, mortality and reproductive failure. Wildlife was also reported to avoid areas with high levels of disturbance.

The impacts of motorized wheeled vehicles to terrestrial wildlife can include disturbance from noise generated by motor vehicles. Determining the effects of noise on wildlife is complicated because responses vary between species. The variation in responses is based upon the type of noise and its duration, frequency, magnitude and location and the species life history characteristics, habitat type, season, activity at time of exposure and whether other environmental stresses are occurring coincident to exposure of noise (Busnel 1978 *In*: Radle 2002, Steidl and

Powell 2006). Effects of noise can cause physiological responses in wildlife including increased heart rate and altered metabolism and hormone balance. Behavioral responses can include head raising, body shifting, short distance movements, flapping of wings (birds) and escape behavior. Together, these effects potentially can lead to bodily injury, energy loss, decrease in food intake, habitat avoidance and abandonment and reproductive loss. The vast majority of studies conducted on wildlife effects from road and motorized trail-associated noise have been done for bird species.

Many studies have reported interactions between roads and ungulates, particularly elk and deer. Some of the studies are contradictory. Rost and Bailey (1979) reported that elk and mule deer avoided roads within a 656 foot (200 meter) distance. While other studies (Noss 2000 and Knight and Gutzwiller 1995) reported 1300 to 3000 feet is the distance at which deer and elk are impacted by roads (Further details in Strand and Sanchez 2010). Thomas et al. (1979) indicated that roads open to vehicular traffic will adversely affect the use of an area by elk and, to a lesser extent, by deer.

Forest roads and motorized trails change the biological and physical conditions on and adjacent to them, creating edge effects with influences beyond the extent of the road prism (Trombulak and Frissell 2000). Trombulak and Frisell (2000) describe eight physical characteristics that are altered by roads: soil density, temperature, soil water content, light, dust, surface-water flow, pattern of run-off and sedimentation.

Long-term use of roads causes soil compaction that lasts long after road use is discontinued. Increases in soil density on decommissioned roads can persist for decades.

Some Potential Effects of Habitat Alteration to Terrestrial Wildlife Habitats

Forest roads and motorized trails can both enhance and decrease habitat for wildlife (Jalkotzy et al. 1997). The road or motorized trail creates edge habitat for species that are habitat generalists, particularly for some mammal species (e.g., coyote and deer mice) and some songbird species. Ravens are more common along roads since carrion is more available along these corridors. For habitat specialists, such as interior dwelling species that require intact, undisturbed patches of habitat such as the American marten and the spotted owl, roads can fragment habitat. Roads and motorized trails can also fragment or disrupt habitat indirectly by introducing exotic or noxious weeds. In addition roads can increase pollutants like dust and vehicle emissions that can contaminate roadside vegetation upon which wildlife feed.

INCREASED ALTERATION AND USE OF HABITATS BY HUMANS

Several studies have indicated that high road densities result in adverse impacts on certain wildlife species. Impacts from high road densities include increased harvest including allowed and prohibited, disturbance/harassment from noise and habitat alteration. Brocke et al. (1988) reported that high road densities can elicit a variety of negative impacts on certain wildlife species. These effects include human disturbance. In Adirondack counties, the black bear population density index showed a ten-fold decrease when road density increased by ten times. Other studies were cited as showing similar sensitivity to road density for other large predators and ungulates.

The science available to describe the interactions between focal wildlife species and roads is more developed than that available to describe the interactions between focal wildlife species and recreation trails. Much of the research has been focused on wide-ranging carnivores and ungulates. Other lesser known species could benefit from additional research on the effects of roads; this is especially true for less mobile species where roads may inhibit movements or fragment habitats.

Disturbance at a specific site was also commonly reported and included disruption of animal nesting, breeding or wintering areas (Linnell et al. 2000, Papouchis et al. 2001, Skagen et al. 1991). Collisions between animals and vehicles were commonly reported and affected a diversity of wildlife species, from large mammals (Gibeau and Heuer 1996, Lehnert et al. 1996) to amphibians (Ashley and Robinson 1996). Finally, edge effects associated with roads or road networks constructed within habitats, especially late-successional forests, were commonly identified (Hickman 1990, Miller et al. 1998).

Late-Successional Forest Associated Species

This species group is associated with mature-to-old forests that contain characteristics of late-successional stages. These characteristics include large trees for a given growing site, relatively high canopy closure and elevated amounts of decadence in the form of snags, down logs, in-tree decay and deformity. The SNF Bioregional MIS Report (USDA Forest Service 2008b) separated late-successional forests into two MIS habitat types 1) Late Seral Open Canopy Coniferous Forest Habitat and 2) Late Seral Closed Canopy Coniferous Forest habitat. This section of Chapter 3 will discuss the two late-successional forest habitat types and associated TES (California spotted owl, Northern goshawk, Great gray owl, American marten, and Pacific fisher) and MIS wildlife (blue grouse and Northern flying squirrel).

California Spotted Owl – Affected Environment

The California spotted owl is designated by the Regional Forester as a sensitive species and is selected as a Management Indicator Species on the SNF. The SNF has 234 designated California spotted owl Protected Activity Centers (PACs) and 228 Home Range Core Areas (HRCAs). Protected Activity Centers are delineated around spotted owl territorial pairs or territorial individuals and are comprised of the best available habitat encompassing 300 acres. The Sierra Nevada Forest Plan Amendment (USDA-FS 2004a) provides direction to designate PACs and HRCAs comprised of the best habitat using California Wildlife Habitat Relationships (CWHR) types 6, 5D, 5M, 4D and 4M. These CWHR types are in essence considered suitable habitat (nesting and foraging) for California spotted owls. Pure eastside pine types are not considered suitable for California spotted owls. Currently, there are 65,950 acres of suitable spotted owl habitat with CWHR types 6, 5D, 5M, 4D and 4M within the analysis area.

The SNF has conducted surveys for spotted owl presence and reproductive status across the forest since the early 1980s. Approximately 200,000 acres of suitable habitat, which includes 3D and 3M habitat types, has been surveyed on the SNF following Pacific Southwest Region, USDA Forest Service Protocol.

Additional information can be found in the BE/BA (Sorini-Wilson, 2010).

California Spotted Owl – Environmental Consequences

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the owl. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to the NFTS within PACs.
- Number of PACs intersected by roads and motorized trails added to the NFTS (Percentage of all PACs in Zone of Influence).
- Acres of roads and motorized trails added to the NFTS within ¼ mile of PACs. A ¼ mile buffer was placed on each side of the road and motorized trail which would

allow for a polygon to be developed and then a calculation would occur through GIS to convert miles to acres.

- Number of PACs occurring within ¼ mile of roads and motorized trails added to NFTS.
- Percentage of spotted owl PACs (total acres) occurring within ¼ mile ‘zone of influence’ (ZOI); of roads and motorized trails added to the NFTS.
- Standard and Guideline #82 has been met because each road and motorized trail was evaluated on how it lays on the landscape in coordination with the PACs and nest sites. If a road or motorized trail was within ¼ mile of a nest site or if the nest site information was greater than 5 years old then a seasonal restriction was applied from March 1 through August 15. According to the spotted owl protocol if the nest site is greater than 5 years old then a survey would need to be conducted (WL-2).

Studies reviewed by Gaines et al. (2003) indicated that northern spotted owls were likely to be affected by the following road and motorized trail-associated factors: Collisions, disturbance at a specific site, physiological response, edge effects and snag reduction. These same factors, as well as “habitat loss and fragmentation” are expected to affect California spotted owls based upon review of the available literature (Verner et al. 1992, Blakesley 2003, Seamans 2005).

Direct Effects

Disturbance: California spotted owls could be disturbed during the nesting season by cross-country travel. Disturbance could lead to reduced time on the nest, thereby threatening eggs or young, with exposure. Disturbance from off-road travel would typically occur in daylight when owls are in the resting portion of the diurnal cycle. Off-road disturbance impacts are limited by the heavily timbered areas where spotted owls nest. In general, these impacts are possible but not likely because the design feature associated with Resource Issue Code WL- 2 is in place to reduce the noise disturbance during the breeding cycle. The minor possibility of off-road disturbance impacts would have no measurable impact on long-term population parameters; therefore, the effect on northern spotted owls of continued cross-country travel is negligible and discountable (same assumption for California spotted owl) (Modoc EIS, Turner 2009, USDA-FS 2009b).

The seasonal closure will be implemented where known nest sites are adjacent to roads and motorized trails or where the surveys are greater than 5 years old, and according to the protocol, should be surveyed to determine current nest location.

The issue of elevated sound and visual disturbance of forest wildlife species remains a complex and poorly understood subject. The Forest Service, Region 5, has generally assumed that activities (including road and trail use) occurring farther than ¼ mile from a spotted owl nest site have little potential to affect spotted owl nesting (USDA-FS 2004a). This distance corresponds to the mean distance at which Mexican spotted owls were found to show an alert response to noise disturbance from chainsaws (Delaney et al. 1999). In addition, Wasser et al. (1997) found that stress hormone levels were significantly higher in male northern spotted owls (but not females) when they were located less than ¼ mile from a major logging road compared to spotted owls in areas greater than ¼ mile from a major logging road. Preliminary results from studies of motorcycle use in proximity to northern spotted owl nest sites show similar findings. These effects are likely more significant for male than for female spotted owls, and appear to be more significant in May when the chicks are still in the nest than in July when they have fledged and have some ability to escape the disturbance (Hayward and Wasser 2008). Chronic high levels of stress hormones may have negative consequences on reproduction or physical conditions of birds

through these effects are not well understood (Marra and Holberton 1998, Gaines et al. 2003, USDI Fish and Wildlife Service 2006).

Short-term responses in birds, as stated by Bowles in Knight and Gutzwiller (1995), have a similar (short-term) continuum of responses as mammals; at the mildest level, they alert. Next, they exhibit mild aversion by flipping their wings (intention movements to fly), pecking at each other and walking, swimming or flying short distances. More intense aversion triggers longer movements, crouching on the nest, attacks on conspecifics or on the source of the disturbance (raptors, terns) and long interruptions of normal behavior. In the extreme case, individuals or flocks respond with panic flight or running.

Indirect Effects

Habitat loss, fragmentation and edge effects: Studies have shown California spotted owls to be sensitive to changes in canopy closure and habitat fragmentation (Seamans 2005, Blakesley 2003, North et al. 2000), which could result from road networks. Roads and motorized trails can result in a decrease in interior forest patch size, decreasing the amount of habitat increasing the distance between suitable interior forest patches for old forest species like the California spotted owl. As migration between suitable habitat patches becomes more difficult, suitable habitats are less likely to remain occupied over time (Reed et al. 1996, Zabel et al. 1992). Trails, with their narrower width, result in little or no reduction in forest canopy and would therefore be unlikely to result in a negative edge effects or habitat fragmentation as compared to roads.

Table 3- 144. Proposed Additions to the NFTS for Alternatives (2, 4 and 5) that Intersects Protected Activity Centers (PACs)

PAC	Alt 2	Alt 4	Alt 5
FR112	0	.60	.60
MA020	0	.82	.82
MA025	3.0	.24	1.7
MA026	.24	.41	.42
MA074	.05	.05	.05
MA075	0	.66	.66
MP008	.76		
MP043	.56	.56	.56
MP080	.24		
Total	4.85 mi	3.34 mi	4.81 mi

ALTERNATIVE 1 – NO ACTION

Effects due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative. Therefore, it is assumed the route proliferation would continue over the short and long-term and the effects of the unauthorized routes would be similar to those discussed under adding roads and motorized trails to the NFTS. Because 605,000 acres of the SNF would be open to cross-country motor vehicle travel, it is likely that there would be the continued use of 552 miles of unauthorized routes and 125 acres of Open Areas under this alternative. There are 209 PACs or HRCAs that intersect with some portion of a roads and motorized trails or Open Areas within this alternative. There are 23,833 acres affected by unauthorized routes within ¼ miles of PACs. The acres reflect buffer overlap between unauthorized routes. There are two Open Areas that are within a HRCA, however, the Open Areas are adjacent to the road and have been in existence for some time and don't appear to affect the owls. The nest site is greater than 1 mile from the Open Areas.

Effects Due to Additions to the NFTS: Under this alternative, there are no roads, motorized trails, or Open Areas proposed for addition to the NFTS; therefore, there will be no effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on spotted owls within the zone of influence for each PAC and associated habitat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to the NFTS roads and motorized trails. It would limit the proliferation of unauthorized routes near spotted owl activity centers, PACs and suitable habitat. This would reduce the risk of direct and indirect effects to the spotted owl from motorized travel over the short and long term; which in turn, is a beneficial effect for spotted owls.

In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic.

Effects Due to Additions to the NFTS: Under this alternative, there are 44 miles of roads and motorized trails and 6 acres of Open Areas proposed for addition to the NFTS. Of the 44 miles added, 11 miles are within three Spotted Owl PACs and eight HRCAs (less than 1 percent or 3 of 234 total PACs and 4 percent or 8 of 228 total HRCAs) (See Table 3- 145 below). The 6 acres of Open Areas are not within any PAC. None of the roads, motorized trails, or Open Areas are within ¼ mile of known nest sites. Since roads and motorized trails proposed within this alternative are native surfaced with slower rates of travel, they would not likely result in any human-caused mortality, but would likely increase minor disturbance to some roosting owls within the analysis area. Although actual disturbance effects will be largely influenced by site-specific factors, it is assumed that all roads and motorized trails within owl habitat may result in minimal disturbance to roosting owls.

Table 3- 145. California Spotted Owl Indicators – Alternative 2

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs/HRCAs	11 miles
Number of PACs/HRCAs intersected by roads and motorized trails added to the NFTS.	9 PACs/ 10 HRCAs
Acres of added facilities ZOI in PACs	5,352 acres
Number of PACs occurring within ¼ mile of the ZOI added to NFTS	8
Percentage of spotted owl PACs (total acres) occurring within ¼ mile 'zone of influence' of roads and motorized trails added to the NFTS	3%

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Changes to vehicle class are not expected to have any detectable impact on wildlife. The source of disturbance, whether an auto, truck or motorized recreation vehicle, is assumed to provide the same magnitude of impact for this analysis.

Changes to the NFTS that have a positive effect on spotted owls are seasonal closures to NFTS roads and motorized trails within the zone of influence for each spotted owl PAC and associated

habitat. In addition, some NFTS roads and motorized trails are proposed to prohibit use (closed year-round); this will also have a positive effect on spotted owls because noise disturbance would not occur and potential harassment by vehicles passing by would not occur.

When there is a change of seasonal closure, there are more restrictive timeframes. There are 446 versus 236 miles of NFTS roads with year-round closures and 986 versus 470 miles of NFTS roads and motorized trails which will be seasonally opened. This is a benefit to wildlife because more habitat will have less disturbance. There would be fewer disturbances to nesting birds as discussed above.

Although the exact timing may vary, spotted owls start nesting near the month of March. Since seasonal closure would overlap the beginning of the nesting period and approximately 98 percent of the spotted owl PACs would be within the closures, it would reduce disturbance to owl within the PACs.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes near spotted owl activity centers and PACs. This would reduce the risk of direct and indirect effects to the spotted owl from motorized travel over the short and long term. Direct and indirect effects are the same as described in Alternative 2.

In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic.

Effects Due to Additions to the NFTS: Under this alternative, there would be no new roads, motorized trails, or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the spotted owl.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS; therefore, the effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes near spotted owl activity centers and PACs. This would reduce the risk of direct and indirect effects to the spotted owl from motorized travel over the short and long term. The effects are the same as described in Alternative 2.

In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic.

Effects Due to Additions to the NFTS: Under this alternative, there would be 51 miles of motorized trails and roads and 37 acres (11 Open Areas) proposed for addition to the NFTS. Of those 51 miles approximately 7 miles would be added to the NFTS that intersect with 13 Spotted Owl PACs/HRCAs. None of the added roads, motorized trails or areas intersects with nest sites. There are two Open Areas that have been established for years within a HRCA. There will be no additional effects to owls because the nest site is greater than 1 mile from the area. Current data does not show owl sightings within ¼ mile of Open Areas.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to

wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Under this alternative, the change to seasonal open period would be a benefit to spotted owls because the roads and motorized trails would be closed during the important breeding times which in turn would be less noise disturbance. There are 552 miles of NFTS roads closed year-round and 1512 miles of roads seasonally closed under this alternative. The ZOI would be less because the roads and motorized trails would not be open during important incubation and nesting times. Under Alternative 1, 236 miles of NFTS roads are closed year-round, and 470 are seasonally closed. There are 140 miles of prohibited roads (roads closed year-round) within the PACs due to the design criteria, associated with Resource Issue Code WL-2 or due to wet weather closures.

Table 3- 146. California Spotted Owl Indicators – Alternative 4

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs	7.4 miles
Number of PACs/HRCAs intersected by roads and motorized trails added to the NFTS	5 PACs/8 HRCAs
Acres of roads and motorized trails added to the NFTS within ¼ mile of PACs	5,352 acres
Number of PACs occurring within ¼ mile added to NFTS (ZOI)	7
Percentage of spotted owl PACs (total acres) occurring within ¼ mile 'zone of influence'; of roads and motorized trails added to the NFTS	3%

Overall, Alternative 4 has beneficial effects to spotted owls because the least amount of habitat and PACs are being impacted.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic.

Effects Due to Additions to the NFTS: Under this alternative, there are 85 miles of roads and motorized trails proposed for addition to the NFTS. There would be less noise disturbance to owls because there would be less vehicles accessing suitable habitat compared to Alternative 1. The design feature, associated with Resource Issue Code WL-2 is in place to help alleviate some of the disturbance to known nest sites.

This alternative also adds the most Open Areas (105 acres (20 areas)) across the SNF. These areas can be used for staging prior to events or overnight use after an event. Spotted owls are nocturnal and it could disrupt their flight pattern for foraging; however, they may return to the area once vehicles have left. Of the 20 areas, two are within HRCA FR119, and are greater than 1 mile from the current nest site location.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). The changes that occur under this alternative would open NFTS

roads or trails which have the potential to disrupt behavior patterns for the spotted owls. They could disperse from an area while noise disturbance occurs and return at a later time. Under this alternative the most changes occur which is opening more area for vehicles and this in turn opens more habitat compared to the action alternatives which could affect the owls nesting or foraging behavior over time. Compared to Alternative 1, there is less habitat that will be affected because less habitat is opened for vehicles. Use will be prohibited on 418 miles of NFTS roads and motorized trails that would be closed year-round. This is compared to Alternative 1 in which 236 miles of roads and motorized trails are closed year-round. An additional 1161 miles more seasonal closures will occur under this alternative than Alternative 1. Of the 418 miles of roads closed year-round, 92 miles are prohibited in PACs. This was implemented with the design feature, associated with Resource Issue Code WL-2 or it was closed year-round for wet weather closures.

Table 3- 147. California Spotted Owl Indicators – Alternative 5

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs	12.6 miles
Number of PACs/HRCAs intersected by roads and motorized trails added to the NFTS	6 PACs/12 HRCAs
Acres of roads and motorized trails added to the NFTS within ¼ mile of PACs	5,352 acres
Number of PACs occurring within ¼ mile of ZOI of roads and motorized trails added to NFTS	19
Percentage of spotted owl PACs (total acres) occurring within ¼ mile 'zone of influence; of roads and motorized trails added to the NFTS	8%

Table 3- 148. Seasonal and Prohibited (Closed Year-Round) Changes to NFTS roads which intersect spotted owl PACs

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Miles of Prohibited Roads	0 miles	110miles/58,764 acres	0	110 miles/58,764 acres	92 miles/48,437 acres
Seasonal closures to protect spotted owl PACs	no	no	no	yes	yes

Cumulative Effects

Overall adding facilities to the NFTS in combination with all the other activities on the SNF will have a minor change to spotted owl habitat or species because it is a negligible amount. It is less than 1 percent of the PACS/HRCAs that are affected by this project. The affect of the action is small enough that it is not contributing to the cumulative effects to the species. Also as shown in Table 3- 165 with regards to percent improvement in late seral closed canopy coniferous forest habitat in comparison to the No Action alternative, the action alternatives would increase the amount of effective habitat for the spotted owl.

In the Notice of Finding on a petition to list the California spotted owl, the USFWS identified that loss of habitat to large forest fires and habitat modification for fuels reduction were the primary risk factors to California spotted owls occurring on NFS lands (USFWS 2006a). Appendix E

provides a list and description of past, present and reasonably foreseeable projects on the Forest and private lands within the SNF boundary. Some, but not all, of these activities will contribute to effects upon California spotted owls.

The effect of motorized trails on spotted owl populations or habitats was not identified as a significant risk factor by either the Forest Service or the USFWS. However, given the proportion of spotted owl nest sites and habitat potentially affected and considering the projections for future increases in recreation uses and OHV activity, Alternative 1 may, over time, contribute to cumulative effects upon spotted owl populations. Because Alternative 1 does not restrict vehicles to designated facilities, there is a high degree of uncertainty about future route proliferation in owl habitat which may have disturbance and habitat effects beyond the effects of routes open to motorized use. Alternative 1 presents the greatest risk of contributing to adverse cumulative effects upon spotted owl habitat and populations because there would not be a prohibition on cross-country travel. Alternative 3 contributes the least to cumulative effects because cross-country travel would be prohibited, open route densities in spotted owl habitat are lowest and no roads or motorized trails would be designated. Alternatives 2, 5 and 4 would result in progressively lower risk to spotted owls due to the amount of roads and motorized trails being added to the system. Considering the proportion of spotted owl habitat influenced by motorized roads and motorized trails and projections for future increase in recreation uses and OHV activity, the alternatives may result in minor cumulative impacts when combined with other past, present and reasonably foreseeable future actions that affected spotted owl habitat. Although the action alternatives may result in cumulative impacts, they are very minor in comparison to existing road, motorized trails and unauthorized route densities and other potentially significant impacts (fire, fuels/vegetation treatments).

Fire records show since 1911, approximately 31,000 acres have burned in PACs and 15,000 acres have burned in HRCAs regarding spotted owl habitat.

Northern Goshawk – Affected Environment

The northern goshawk is designated as a Forest Service Sensitive Species in the Pacific Southwest Region. There are currently 65,950 acres of suitable goshawk habitat on the SNF as defined by CWHR types 4M, 4D, 5M, 5D. The SNF does not have CWHR 6. Northern goshawk territories are managed on the SNF as Protected Activity Centers (PACs) as prescribed by the SNFPA (USDA-FS 2004a). To date, the SNF has 55 known northern goshawk PACs and territories. As of 1998, 20 of the 55 territories have been incorporated into the Regional Forest Service database. They were included for submittal to the regional database based on the following criteria: 10 have at least one active nest site for which the nest location is known; four are historical nest sites for which the nest location is unknown; four are based on observations of young; two are based on observations of territorial defense or repeated sightings. The remaining 35 are based on incidental sightings of goshawk and/or suitable goshawk habitat. Additional information can be found in the BE/BA (Sorini-Wilson, 2010).

Northern Goshawk – Environmental Consequences

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the Northern goshawk. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to the NFTS within PACs.

- Number of PACs intersected by roads and motorized trails added to the NFTS (Percentage of all PACs in Zone of Influence).
- Miles of roads and motorized trails added to the NFTS within ¼ mile of PACs
- Number of PACs occurring within ¼ mile of roads and motorized trails added to NFTS.
- Percentage of goshawk PACs (Total acres) occurring within ¼ mile ZOI of roads and motorized trails added to the NFTS.
- Standard and Guideline #82 has been met because each route was evaluated on how it lays on the landscape in coordination with the PACs and nest sites. If a road and motorized trail was within ¼ mile of a nest stand, a seasonal restriction was applied from February 15 through September 15. If the nest site information was greater than one year old, then a survey was conducted to see if the nest stand could be located and then the seasonal restriction was applied, associated with Resource Issue Code WL-1 within the season of use.

Direct and Indirect Effects

Disturbance: Northern goshawks actively defend nest sites during portions of the breeding season. Cross-country travel could lead to direct effects by disturbance that disrupts pair-bonding, cause exposure of eggs or young to inclement weather and increases adult energy expenditures. Little published information exists regarding the sensitivity of northern goshawks to nest site disturbances from recreational activities.

Human disturbance has the potential to cause goshawks to abandon nesting during the nesting and post fledgling period (February 15 through September 15). Goshawks initiate breeding when the ground is still covered in snow and sometimes they locate their nests along roads and trails when they are not yet in use. Additionally, roads and trails provide flight access for goshawk. When the snow melts, these sites can potentially be areas of conflict as motorized recreation activities begin. Joslin and Youmans (1999) recommend maintaining low road densities to minimize disturbance to goshawk. Grubb et al. (1998) reported that vehicle traffic on roads more than ¼ mile from nests did not elicit any discernable behavioral response from goshawks.

There may be disturbance, however, the seasonal closure will be implemented (Feb 15 – Sept 15) as design feature where known nest sites are adjacent to roads or motorized trails or where there is potential for disturbance. The purpose of implementing the design feature is to reduce noise disturbance to goshawks.

Habitat loss, fragmentation and edge effects: The major threat to northern goshawks at the present time, involves the effects of vegetation management (e.g. timber harvest, fuels treatments) and wildfire on the amount, distribution and quality of habitat (DeStefano 1998).

A network of roads and motorized trails can fragment goshawk habitat by reducing canopy closure (Beier and Drennan 1997, Daw and DeStefano 2001) and by reducing forest interior patch size. However, how habitat fragmentation from roads and trails affects goshawk habitat suitability is not well understood. Generally, the wider the road, the more it can fragment habitat. Fragmented habitat, in turn, can cause edge effect, where the goshawk may avoid areas because an area is too open being at the edge of habitat. They are more likely to hunt and nest in habitat with closed canopy. Compared to smooth surface roads, native surface roads probably do not pose as much risk of habitat fragmentation due to their narrow width relative to the natural tree spacing in late-seral forests.

Trails, with their narrower width, result in little or no reduction in forest canopy and would therefore be unlikely to result in a negative edge effects or habitat fragmentation as compared to roads.

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative; therefore, it is assumed the route proliferation would continue over the short and long term. No NFTS intersect known goshawk nests. There are 552 miles of unauthorized routes and 125 acres of 59 Open Areas.

Effects Due to Additions to the NFTS: Under this alternative, there are no roads, motorized trails, or Open Areas identified for addition to the NFTS; therefore, there would be no direct or indirect effects to goshawks.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS. Closure conditions would not change; therefore, there would be no direct and indirect effects to the Northern goshawk. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on goshawks within the zone of influence for each PAC and associated habitat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes near goshawk activity centers, territories and preferred habitat. This would reduce the risk of direct and indirect effects to goshawks from motorized travel over the short and long-term.

In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic.

Effects Due to Additions to the NFTS: The SNF has monitored nest sites in proximity to some roads and trails. There are 14 NFTS roads and motorized trails that will be added and intersect goshawk territories (175 ac) or PACs (200 ac) (See Table 3- 149 below).

Proposed motorized trail KD-122 (Alternatives 2 and 5) has the most potential to disturb goshawks because it is adjacent to a historical nest site. The goshawks have not been there for at least three survey years (Sorini-Wilson, 2010). The roads and motorized trails that are listed in Table 3- 149 intersect territories or PACS but not known nest sites.

Actual nest locations are often difficult to locate and may move around from year-to year within a PAC. Therefore, actual nest locations remain unknown for some of the PACs and those nests that have been located may have moved since it was last located.

Since roads and motorized trails proposed within this alternative are native surface roads and motorized trails with slower rates of travel, they would not likely result in any human-caused mortality, but would likely increase disturbance to some roosting goshawks within the project area. Although actual disturbance effects will be largely influenced by site-specific factors, it is assumed that all roads and motorized trails within a PAC may result in disturbance to some goshawks. Therefore, this alternative would result in some level of disturbance within approximately 7 percent (4/55) of the goshawk PACs in the project area. As mentioned, it is assumed that activities greater than ¼ mile away have little potential to affect goshawks. Under this alternative, approximately 7 percent of goshawk PACs (percentage of total PACs) would

occur within the zone of influence of roads and motorized trails. Disturbance resulting from these actions is likely to result in increased flushing from roosts to perches, increased alarm responses and increased stress hormone levels in some individual goshawks; however, applying the seasonal closures associated with Resource Issue Code WL-1 and SW-1 will minimize the disturbance to some individual goshawks.

Table 3- 149. Roads and Motorized Trails Proposed to be Added to NFTS (Alts 2, 4 and 5) that Intersect Goshawk Territories or PACs

Analysis Unit	Alternative	Roads and Motorized Trails	Goshawk Territory or PAC
Westfall	2	PK-5	SIEGH47
Westfall	2,4,5	PK-4	SIEGH47
Westfall	2,5	SR-21z	SIEGH47
	2	SV-2	SIEGH47
Westfall	2,5	JSM107	SIEGH45
Westfall	2,5	SV-1	SIEGH47
	2,5	SV-1b	SIEGH47
Westfall	4,5	SV-1a	SIEGH47
Tamarack-Dinkey	2,4,5	JH-115	SIEGH6
Dinkey-Kings	2,5	KD-122	SIEGH6
Tamarack-Dinkey	2,5	PK-30z	SIEGH21
Tamarack-Dinkey	2,5	PK-31z	SIEGH21
Tamarack-Dinkey	2,5	PK-32x	SIEGH21
Tamarack-Dinkey	2,5	PK-33z	SIEGH21

As discussed under data sources, the roads and motorized trails assessment was conducted, where GIS suggested further field data was needed. Details of field visits and forms are on file at the High Sierra Ranger District, wildlife biology office.

Actions proposed in this alternative would result in some indirect effects through habitat modification. The addition of roads and motorized trails to the NFTS within and near PACs would result in minor amounts of habitat fragmentation. Since the majority of these roads and motorized trails are narrow and native surfaced they would only result in minor reductions in overhead cover and would not significantly reduce goshawk movement between habitat patches.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Changes to the NFTS that have a positive effect on goshawk are seasonal closures to NFTS roads within the zone of influence for each goshawk PAC and associated habitat. In addition, some NFTS roads are proposed to be prohibited (closed year-round) (see table below titled *Seasonal and Prohibited (Closed Year-Round) changes to NFTS roads Goshawk PACs*); this will also have a positive effect on goshawks. Compared to Alternative 1, there are 446 miles versus 236 miles of year-round closures and 986 versus 470 miles of roads and motorized trails that will be seasonally closed. The table below (Table 3- 150) describes the indicators for Alternative 2.

Although the exact timing may vary, goshawks start nesting near the month of February. Since seasonal closure would overlap the beginning of the nesting period and approximately 90 percent of the goshawks PACs would be within the closures, it would reduce disturbance to goshawks within PACs.

Table 3- 150. Northern Goshawk Indicators – Alternative 2

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs	2.4 miles
Number of PACs or territories intersected by roads and motorized trails added to the NFTS	5
Acres of added roads and motorized trails ZOI in PACs	1969 acres
Number of PACs occurring within ¼ mile of the ZOI of roads and motorized trails added to NFTS	4
Percentage of goshawk PACs (total acres) occurring within ¼ mile of the 'zone of influence	7%

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic.

Effects Due to Additions to the NFTS: Under this alternative, there would be no new roads, motorized trails, or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the goshawks.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS; therefore, the effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes near goshawk PACs and territories. This would reduce the risk of direct and indirect effects to the goshawk from motorized travel over the short and long-term. The effects are the same as described in Alternative 2.

In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of roads and motorized trails are proposed for addition to the NFTS. Of those 51 miles approximately 0.2 miles would be added to the NFTS that intersect with goshawk PACs or territories. As seen in the table below (Table 3- 151), there are fewer roads and motorized trails that are proposed under this alternative than in other alternatives, which in turn, would be beneficial to wildlife; however, effective habitat use will be disturbed within the 1,294 acres ZOI for goshawks due to edge effect. In this zone, there is the potential that the species may not utilize the area because of noise and, due to disturbance, there is potential for greater energy expenditure. There are no Open Areas being added within goshawk PACs or territories; therefore, there will be no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Alternative 4 would prohibit (close year-round) use on 552 miles of NFTS roads and motorized trails. This is opposed to the 236 currently prohibited to motor vehicle use year-round. There would be 1568 miles of seasonal closures as opposed to the 470 that currently exist. There would be 316 more miles closed year-round. Because changes to the NFTS would include wet seasons of use restrictions (associated with Resource Issue Code SW-1) early breeding activities such as pair-bonding and nest initiation may have fewer disturbances. However, since this is also the period when roads are often blocked by snow drifts and unavailable for wheeled travel the effect of changes to season of use (compared to Alternative 1) is expected to be minor to undetectable.

Table 3- 151. Northern Goshawk Indicators – Alternative 4

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs	.2 miles
Number of PACs or territories intersected by roads and motorized trails added to the NFTS	2
Acres of roads and motorized trails added to the NFTS within ¼ mile (ZOI) of PACs	1294
Number of PACs occurring within ¼ mile added to NFTS	6
Percentage of goshawk PACs (total acres) occurring within ¼ mile of the 'zone of influence'	11%

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic.

Effects Due to Additions to the NFTS: Under this alternative there are 85 miles of roads and motorized trails and 105 acres of 20 Open Areas proposed for addition to the NFTS. The effects are similar to Alternative 2 but because there is an increase in the number of roads and motorized trails to be added to the NFTS, near activity centers and within preferred habitat, there would be a slight increase in the direct and indirect effects to goshawk within the project area. There are no known goshawk nests adjacent to the proposed Open Areas.

The addition of roads and motorized trails to the NFTS within and near goshawk PACs would result in minor amounts of habitat fragmentation. Since the majority of these roads and motorized trails are narrow and native surfaced, they would only result in minor reductions in overhead cover and would not significantly reduce goshawk movement between habitat patches.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Actions proposed in this alternative would result in some indirect effects through habitat modification. There are 182 more miles of year-round closures and 1161 more miles of season closures than the current situation (Alternative 1, No Action). It would be a

beneficial effect to the species because more area would have closures during the important nesting time for goshawks (Table 3- 153).

Table 3- 152. Northern Goshawk Indicators – Alternative 5

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs	1.9 miles
Number of PACs or territories intersected by roads and motorized trails added to the NFTS	4
Acres of roads and motorized trails added to the NFTS within ¼ mile of PACs	2548 acres
Number of PACs occurring within ¼ mile (ZOI) added to NFTS	8
Percentage of goshawk PACs (total acres) occurring within ¼ mile of the 'zone of influence	15%

Table 3- 153. Seasonal and Prohibited (Closed Year-round) Changes to NFTS roads Goshawk PACs

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Miles of Prohibited Roads	0 miles	8.18 miles/ 2124 ac	0	8.32 miles/2301 ac	6.27 miles/1772 ac
Seasonal closures to protect goshawk PACs	no	no	no	yes	yes

Cumulative Effects

In 2001 and 2004 the Forest Service amended Sierra Nevada Forest Plans to better address the needs of old forest-associated species (USDA-FS 2001, 2004a). During this assessment, the following risk factors were identified for northern goshawks in the Sierra Nevada: 1) changes to the amount and quality of goshawk habitat from timber harvest and fuels treatments; 2) loss of breeding territories due to stand replacing fires; and 3) breeding site disturbance from vegetation treatments, human recreation or falconry harvest. Appendix E provides a list of cumulative projects on the forest. Some, but not all, of these activities will contribute to effects upon northern goshawks.

Vegetation and fuels reduction projects will continue to be the primary activity affecting goshawk habitat on the SNF. These projects will likely occur on estimated 2000 to 3000 acres per year on underburns and 1000 acres per year on pile burning (Ballard 2009). Since 1917, there are approximately 1266 acres (portions of 12 PACs/territories) within goshawk PACs that have had fire.

The effect of open roads and motorized trails on goshawk populations or habitats was not identified as a significant risk factor by the Forest Service, but breeding site disturbance from human recreation was addressed (USDA 2001 and 2004a). Given the proportion of goshawk nest sites and habitat potentially affected, Alternative 1, may, overtime, contribute to cumulative effects to the goshawk populations. Alternative 1 does not restrict cross-country travel to designated facilities; there is a high degree of uncertainty about future route proliferation in goshawk habitat which may have disturbance and habitat effects beyond the effects of routes

open to motorized use. There are 31 PACs/territories that are affected by unauthorized routes under Alternative 1. There are 20,910 acres of ZOI within ¼ mile of Goshawk PACs. The sum reflects overlap that occurs between PACs. There are 48 miles of roads and motorized trails that currently exist within Goshawk PACs.

Alternative 3 contributes the least to cumulative effects because cross-country travel would be prohibited, seasonally open NFTS densities in goshawk habitat are lowest and no additional roads or motorized trails would be designated. Alternatives 2, 5 and 4 would result in progressively lower risk to goshawks due to the amount of roads and motorized trails being added to the system.

Considering the proportion of goshawk habitat influenced by roads, motorized trails, increases in recreation use, OHV activity, as well as timber harvest and fuels treatments, the alternatives may result in minor cumulative impacts when combined with other factors affecting goshawk habitat. Although the action alternatives may result in cumulative effects, they are minor in comparison to existing NFTS road densities and other potential impacts (see Table 3- 142, Table 3- 143 and Table 3- 166). As shown in Table 3- 165 with regards to percent improvement in late seral closed canopy coniferous forest habitat in comparison to the No Action Alternative, the action alternatives would increase the amount of effective habitat for the goshawk.

Great Gray Owl – Affected Environment

The great gray owl is listed as sensitive on the Pacific Southwest Region Forester's Sensitive Species List (USDA-FS 1998). In the Sierra Nevada, great gray owls are found in mixed coniferous forest from 2,400 to 9,000 feet elevation where such forests occur in combination with meadows or other vegetated openings. Nesting usually occurs within 600 feet of the forest edge of meadows and adjacent open foraging habitat. Most nests are made in broken top snags (generally firs), but platforms such as old hawk nests, mistletoe infected limbs, etc. are also used. Nest trees or snags are generally greater than 21 inches in diameter at breast height (dbh) and 20 feet tall. There is approximately 9000 acres of suitable great gray owl habitat (nesting and foraging) within the analysis area. There are 10 great gray owl PACs on the SNF. Additional information can be found in the BE/BA (Sorini-Wilson, 2010).

Great Gray Owl – Environmental Consequences

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the great gray owl. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to the NFTS within PACs
- Acres of roads and motorized trails added to the NFTS that intersects PACs
- Acres of habitat within ZOI
- Acres of roads and motorized trails ZOI within 600 feet of meadows in habitat
- Number of PACs occurring within ¼ mile of the ZOI of roads and motorized trails added to NFTS
- Percentage of great gray owl PACs occurring within ¼ miles of the ZOI

Direct and Indirect Effects

Great gray owl foraging habitat (meadows) can be entered with OHVs if they don't damage resources under Alternative 1; however, vehicles are not allowed in meadows under the rest of the alternatives. The edge effect, as it pertains to meadows, may not be as great because there are few roads and motorized trails that impact the suitable nesting habitat near meadows.

Disturbance: There may be some disturbance to great gray owl nesting habitat (e.g. noise disturbance when vehicles are passing by) where roads and motorized trails are within the habitat.

The use of meadows for foraging is likely affected by the quality of the meadow habitat. Meadow habitat quality may be affected numerous different ways by motorized travel. The most obvious way motor vehicles may impair meadow quality is through direct mechanical damage (rutting). Since soil typically has lower bulk density and can be more easily penetrated when it is wet, mechanical damage often occurs in meadows that are naturally wet or in dry meadows after significant rainfall or immediately following the retreat of the snow at higher elevations. When roads or trails are created in meadows they may intercept surface and subsurface flow (Kattelman 1996). When flows are intercepted and redirected, meadow drying occurs, changing the fauna and flora associated with it.

Habitat loss, fragmentation and edge effects: There may be some loss of habitat or edge effect to great gray owls; however, it is thought to be minimal since roads and motorized trails are not adjacent to meadows under all action alternatives. Changing the faunal community within meadows may impact quantity and quality of great gray owl foraging. Two species that have been noted as being important prey items to great gray owls are microtines and pocket gophers (Franklin 1988, Winter 1981, Winter 1982). Winter (1981) and (1982) found that microtines may be a preferred prey item for great gray owls in the Sierra Nevada area and may be essential for successful reproduction. He further suggested that *Microtus* were also associated with moist areas that had good grass cover. Therefore, slight shifts in meadow hydrology caused by motorized travel may impact suitable habitat for microtines; thereby potentially adversely affecting the quantity and quality of great gray owl prey.

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative; therefore, it is assumed the route proliferation would continue over the short and long term. The use of these roads and motorized trails and the continued proliferation of new unauthorized routes would result in increasing amounts of direct and indirect effects to great gray owls. There are 4.9 miles of unauthorized routes and NFTS roads and motorized trails that intersect 10 PACs, but no NFTS roads and motorized trails or unauthorized routes intersect known great gray owl nest stands.

Effects Due to Additions to the NFTS: Under this alternative, there are no roads, motorized trails, or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effects to great gray owls.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on great gray owls within the zone of influence for each PAC and associated habitat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes near great gray owl PACs and habitat. This would reduce the risk of disturbance to great gray owls from motorized travel over the short and long term.

Effects Due to Additions to the NFTS: There are 0.11 miles of motorized trail proposed for addition to the NFTS that intersect great gray owl PACs. There would be potential noise disturbance to the owls if this motorized trail was included in the system. The Open Area proposed to be added is not within great gray owl habitat; therefore, there would be no effect.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Although the exact timing may vary, great gray owls start nesting near the month of March. Since seasonal closure associated with Resource Issue Codes WL-3 or SW-1 would overlap the beginning of the nesting period, and approximately 90 percent of the great gray owl PACs would be within the closures, it would reduce disturbance to owl within the PAC.

Table 3- 154. Great Gray Owl Indicators – Alternative 2

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs	0.11 miles
Number of PACs or territories intersected by roads and motorized trails added to the NFTS	1 PAC
Acres of roads and motorized trails added to the NFTS that intersect the one PAC	150 acres
Acres of habitat within ZOI	53
Acres of roads and motorized trails ZOI within 600 feet of meadows in GGO habitat	134
Number of PACs occurring within ¼ mile of ZOI or roads and motorized trails added to NFTS	1
Percentage of great gray owl PACs (total acres) occurring within ¼ mile of the 'zone of influence'	5%

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Effects Due to Additions to the NFTS: Under this alternative, there would be no roads, motorized trails, or Open Areas proposed for addition to the NFTS; therefore, there would be no change to direct or indirect effect to great gray owls.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, the effects would be the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Effects Due to Additions to the NFTS: Under this alternative, there would be no roads, motorized trails, or Open Areas proposed for addition to the NFTS within great gray owl PACs or within ¼ mile of activity centers, which is a benefit to the species because there would be less noise disturbance as compared to Alternative 1. In turn, there would be less indirect effects to prey base because there are less roads and motorized trails disturbing owl habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). This alternative would not result in any changes to NFTS that would affect great gray owls because there are no roads or motorized trails within the PACs or within ¼ mile of activity centers.

Table 3- 155. Great Gray Owl Indicators – Alternative 4

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs	0 miles
Number of PACs or territories intersected by roads and motorized trails added to the NFTS	0
Acres of roads and motorized trails added to the NFTS that intersects PACs	0 acres
Acres of habitat within ZOI	895
Acres of roads and motorized trails ZOI within 600 feet of meadows in GGO habitat	2423
Number of PACs occurring within ¼ mile of the ZOI of roads and motorized trails added to NFTS	3
Percentage of great gray owl PACs (total acres) occurring within ¼ mile of the 'zone of influence'	16%

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes near great gray owl PACs and habitat. This would reduce the risk of direct and indirect effects to great gray owls from motorized travel over the short and long term.

Effects Due to Additions to the NFTS: Under this alternative, there is one motorized trail in Miami proposed for addition to the NFTS, TR-08 (WES Analysis Unit), which has the most potential to disturb great gray owls because it intersects a great gray owl PAC. Of the 9000 acres of suitable habitat, there would be 150 acres of motorized trail (ZOI for TR-08) that intersect habitat. Because the seasonal restriction (March 1 through August 15) associated with Resource Issue Code WL-3 would be applied to this roads and motorized trails, the noise disturbance effect is minimized. There are no Open Areas within great gray owl habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Although the exact timing may vary, great gray owls start nesting near the month of March. Since seasonal closure associated with Resource Issue Codes WL-3 and

SW-1 would overlap the beginning of the nesting period, and approximately 90 percent of the great gray owl PACs would be within the closures, it would reduce disturbance to owls within the PAC.

Table 3- 156. Great Gray Owl Indicators – Alternative 5

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within PACs	0.11 miles
Number of PACs or territories intersected by roads and motorized trails added to the NFTS	1 PAC
Acres of roads and motorized trails added to the NFTS that intersects the one PAC	150 acres
Acres of habitat within ZOI	1255
Acres of roads and motorized trails ZOI within 600 feet of meadows in GGO habitat	3531
Number of PACs occurring within ¼ mile added to NFTS	3
Percentage of great gray owl PACs (total acres) occurring within ¼ mile 'zone of influence'	16%

Cumulative Effects

Currently, there are 4.9 miles of unauthorized routes and roads that intersect 10 PACs.

Appendix E provides a list and description of cumulative projects on the SNF. Some, but not all, of these activities will contribute to effects upon great gray owls. Factors responsible for low numbers of great gray owls breeding in the Sierra Nevada are not fully known.

In some meadows, livestock grazing has reduced the suitability of meadow vegetation for microtine rodents and other great gray owl prey (USDA 2001).

Although human disturbance has not been recognized as a significant threat to great gray owls, the use of motor vehicles in meadow habitats can have significant impacts to meadow hydrology. The greatest risk of impacts to great gray owls and their habitats is in Alternative 1 since it would not prohibit cross-country travel and meadows are often easily accessed by vehicles. Therefore, the direct and indirect effects of Alternative 1 and the effects of continued livestock grazing may have significant impacts to individuals because of the potential change to meadow hydrology. The meadow hydrology impacts the prey base and in turn affects the foraging habitat which is within the vicinity of the nesting habitat. Conversely in Alternatives 2, 4 and 5, motorized trails would no longer occur in meadows, therefore, there should not be an adverse effect to owls within the project area because at least that one component, (vehicles in meadows), would not impact meadow hydrology.

American Marten – Affected Environment

The American marten is designated by the Regional Forester as a Sensitive Species and is selected as a Management Indicator Species on the SNF. Martens prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy closure and an interspersed of riparian areas and meadows. Important habitat attributes are: vegetative diversity, with predominately mature forest; snags; dispersal cover; and large woody debris (Allen 1987). Martens selected stands with greater than 40 percent canopy closure for both resting and foraging and avoided stands with less than 30 percent canopy closure (Spencer et al. 1983). Martens generally avoid habitats that lack overhead cover, presumably because these areas do not provide

protection from avian predators (Allen 1982, Bissonette et al 1988, Buskirk et al. 1994, Spencer et al. 1983).

At a landscape scale, patches of preferred habitat and the distribution of openings with respect to habitat patches may be critical to the distribution and abundance of martens (Buskirk et al. 1994). While marten use small openings and particularly meadows for foraging, these openings must occupy a small percent of the landscape. Martens have not been found in landscapes with greater than 25 percent of the area in openings (Hargis and Bissonette 1997; Potvin et al. 2000). As landscapes become fragmented, the combination of increasing isolation and decreasing patch size of suitable habitat compounds the results of simple habitat loss (Andren 1994). For species like marten, this is likely to result in a decrease of greater magnitude than can be explained solely by the loss of suitable habitat. Marten may be a species that demonstrate exponential population declines at relatively low levels of fragmentation (Bissonette et al. 1997, *in* USDA-FS 2004a).

Standard and guideline #89 states “mitigate impacts where there is documented evidence of disturbance to the den sites from existing recreation, off-highway vehicle route, trail and road uses (including road maintenance). Evaluate proposals for new roads, trails, off-highway vehicle routes and recreational and other developments for their potential to disturb den sites.” No mitigation needs to occur at this time for marten because there are no known marten den sites on the SNF.

Additional information can be found in the BE/BA (Sorini-Wilson, 2010).

The entire project area is approximately 800,000 acres, of that there are approximately 131,000 acres of habitat for the marten (15 percent of the area).

American Marten – Environmental Consequences

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the marten. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to the NFTS within marten habitat
- Acres of habitat in the project area
- Miles of unauthorized roads and motorized trails within the habitat, and the acres of habitat encompassed by their ¼ mile zone of influence
- Miles of NFTS roads, private roads, and other public roads within the habitat, and the acres of habitat encompassed by their ¼ mile zone of influence
- Total road density within the habitat (including all roads, motorized trails, and unauthorized roads and motorized trails with permitted use)
- Acres of managed and unauthorized Open Areas within the habitat

Direct and Indirect Effects

Disturbance: The marten could be affected by loss of dens, increased disturbance of individual martens and by indirect impacts to prey. Motorized use has the potential to result in direct mortality on higher speed roads, collapse den sites, resulting in the potential loss of adults or young. Motorized use can also increase disturbance, resulting in additional energy expenditures. Indirectly, vehicles can affect the squirrel populations that marten primarily feed on. Squirrel populations may be impacted by increased disturbance resulting in lowered energy reserves

available for the production of young. If cross-country travel occurs to the extent that soil compaction was to occur, food resources for squirrels, particularly truffles, could be diminished. Reduced production of young and reduced production of food would reduce the size of squirrel populations available for marten to prey upon (personal observation Turner 2009).

Zielinski et al. (2008) studied the effects of motor vehicles (including over the snow vehicles) on marten in the Lake Tahoe and Sierra National Forests. They evaluated the effects at the two study sites by comparing marten occupancy rates and probabilities of detection in areas where recreational vehicle use is allowed and encouraged (motorized areas) with wilderness areas where vehicles are prohibited (non-areas). Martens were exposed to relatively low levels of disturbance in the study areas. The authors estimated that a marten might be exposed to 0.5 vehicle passes/hour and that this exposure had the greatest effect on less than 20 percent of a typical home range area. In addition, most motor vehicle activity occurs during the day, when martens tend to be less active. The study found that marten occupancy or probability of detection did not change in relation to the presence or absence of motorized facilities and OHV use when the facility (plus a 50 meter buffer) did not exceed about 20 percent of a 50 square kilometer area, and traffic did not exceed one vehicle every 2 hours. The authors hypothesized that the risks posed to martens may not be perceived by martens as great enough to relocate or they may habituate to the disturbance. The study did not, however, measure behavioral, physiological or demographic responses, so it is possible that motor vehicles may have effects, alone or in concert with other threats, that were not quantified in the study. As stated by Zielinski as a management implication, placing motorized facilities so they avoid high-quality marten habitat (late successional conifer forests near meadows and riparian areas (Spencer et al. 1983) will minimize the possibility that martens encounter motor vehicle stimuli when they are actively engaged in foraging or social behavior.

In reviewing Zielinski's paper (Zielinski et al. 2008), none of the response variables measured suggested martens were affected by the level of motor vehicle use that occurred in the study sites. The approach assumed that if increased motor vehicle use had negative effects on martens they would observe 1) fewer occupied sample units, 2) greater nocturnal behavior or 3) few females in the areas. The approach excluded measuring the potential direct effects of motor vehicles on individual martens and they do not know how they would react in the presence of motor vehicles or their sound or whether their exposure to vehicles generates a stress response that produced deleterious effect on reproduction or survival.

Bowles reported (in Knight and Gutzwiller 1995) from a few studies (Edge and Marcum 1985 on elk; Dorrance et al. 1975; Singer and Beattie 1986 on deer, and Gese et al. 1989 on coyotes) that the range at which animals avoided traffic was approximately the range at which they could detect traffic noise, suggesting that traffic noise was meaningful through association with human activity. Even if motor vehicle disturbance is proven significant, most of the effects of noise disturbances are mild enough that they may never be detectable as changes in population size or population growth against the background of normal variation.

Habitat loss, fragmentation and edge effects: Roads in general contribute to habitat fragmentation, a reduction in habitat connectivity and potential for road kill of marten and their prey. Noise, dust and associated disturbance will be site specific and relatively short-term, but may extend into adjacent forest areas.

Habitat modification resulting from the removal of near ground vegetation and coarse woody material appears to be the primary potential effect of adding roads and motorized trails to the NFTS. Localized areas of low growing native vegetation may be modified (e.g. crushed or uprooted). This could result in a minor reduction in habitat for forest birds and rodents which form the majority of prey items for American martens.

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative; therefore, it is assumed the route proliferation would continue over short-and long-term effects.

Alternative 1 would have the greatest impact to marten habitat because it has the largest number of motorized trail open to the public and the highest road density (Table 3- 165).

Although occasional direct mortality may occur from collisions with off-road vehicles, this appears to be an exceedingly rare event for the marten and has not been reported to occur within the SNF. It is possible this could occur under this alternative; however, given existing use and mobility of the species within this group, such occurrences would remain rare and inconsequential to species population dynamics. At the long-term analysis point, assuming an increase of off-highway use, direct mortality events would occur more frequently, probably increasing at a rate similar to the rate of increase of off-highway use.

Included with cross-country travel are the effects from the continuation of use on 552 miles of unauthorized routes and 125 acres of Open Areas. Of the 552 miles of unauthorized routes, 75 miles are within marten habitat (13 percent) of the analysis area.

A larger impact, both in the short term and the long term, would be disturbance that would cause individuals to move or alter behavior. This alternative would provide potential disturbance to marten. The amount of disturbance that would affect any of the species is dependent on vehicle use, with more vehicles potentially being more disturbances.

Effects Due to Additions to the NFTS: There are no proposed additions to the NFTS under this alternative; therefore, there will be no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the current season of use on NFTS roads. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on marten within the zone of influence for the species and associated habitat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to the marten by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The marten would not be affected by disturbance, trampling or indirect impacts to prey or food resources from cross-country vehicle travel. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails, and one, 6-acre Open Area are proposed for addition to the NFTS. Of the 44 miles, 10.92 miles are within marten habitat. The addition of roads and motorized trails could affect marten because there would be noise disturbance to the species. There are incidental observations of marten within ¼ mile of the Open Area. This alternative would contain 92 percent less roads and motorized trails (44/552) than Alternative 1.

Actions proposed in this alternative would result in some indirect effects through habitat modification. The addition of roads and motorized trails to the NFTS within preferred marten habitat would result in minor amounts of habitat fragmentation. Since the majority of these roads and motorized trails are narrow and native surfaced, they would only result in minor reductions in overhead cover and would not significantly reduce marten movement between habitat patches.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Compared to Alternative 1, there would be 446 versus 236 miles closed year-round and 986 miles versus 470 seasonally closed. These NFTS facilities would have minimal disturbance from vehicles during the closure periods. Since the closure periods coincide with the Resource Issue Code SW-1 and cover winter and early spring, early denning activities may have fewer disturbances. However, this is also the period when facilities are often blocked by snowdrifts and unavailable for wheeled travel. Therefore, the impact is expected to be variable by year and minor to undetectable. Closure and removal of roads has been found to effectively provide wildlife security and increase the amount of available wildlife habitat (Wildland CPR 2006).

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Effects Due to Additions to the NFTS: Under this alternative there would be no roads, motorized trails, or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to marten.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative there would be no changes to the seasons of use; therefore, the effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to marten by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The potential impacts discussed under Alternative 1 from cross-country travel would not occur. The marten would not be affected by disturbance, trampling or indirect impacts to prey or food resources.

Effects Due to Additions to the NFTS: Under this alternative, 42 miles of NFTS motorized trails, 9 miles of roads and 11 Open Areas that are equivalent to 37 acres are proposed for addition to the NFTS. Of the added 51 miles, 15 miles (30 percent) are within suitable marten habitat. There is the potential that the marten may not utilize the area because of noise and due to disturbance there is potential for greater energy expenditure. There are no Open Areas within suitable marten habitat.

Since there is a decrease in Alternative 4 in the number of roads and motorized trails added to the system compared to what currently exists under Alternative 1, within marten habitat, there would be a decrease in direct or indirect effects to marten within the project area. These decreases would result in fewer individuals being impacted and less habitat being fragmented and this alternative is unlikely to result in impacts to marten populations within the project area.

Alternative 2 and 4 would have similar impacts because approximately the same amount of miles of roads and motorized trails would be added within marten habitat to the existing system. There would be some effects to marten, such as noise disturbance or displacement, because of roads being opened.

As seen in Table 3- 143 and Table 3- 165, there are fewer roads and motorized trails proposed to be added to the NFTS which, in turn, could be beneficial to wildlife because there would be fewer disturbances.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Alternative 4 would prohibit (close year-round) use on 552 miles of NFTS roads and motorized trails. This is opposed to the 236 currently prohibited. Currently, there are 465 miles of seasonal closures; however, under this alternative there would be 1568 miles seasonal closures. These changes would incorporate the roads and motorized trails to be closed during the important time periods for species. These areas would result in no disturbance from vehicles during the closure periods. Since the closure periods cover winter and early spring, early denning activities may have fewer disturbances. However, this is also the period when roads and motorized trails are often blocked by snow drifts and unavailable for wheeled travel. Therefore, the seasonal closure impact is expected to be minor to undetectable.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to the species within this group by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 70 miles of motorized trails, 15 miles of roads, and 20 Open Areas equivalent to 105 acres are proposed for addition to the NFTS. Of the 85 miles, 20 miles (24 percent) are within marten habitat. Under the action alternatives, there would be the potential for the greatest effect because there are the most roads and motorized trails open; however, it is still less than what currently exists. There are no Open Areas within marten habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Under this alternative, there are 418 miles of roads and motorized trails closed year-round. This is opposed to the 236 currently closed. There would be 1625 miles seasonally closed under this alternative as opposed to the 470 currently closed.

These changes would incorporate the roads and motorized trails to be closed during the important time periods for marten. These areas would have no disturbance from vehicles during the closure periods. Since the closure periods coincide with the associated Resource Issue Code SW-1, it covers winter and early spring early denning activities; therefore, there may have fewer disturbances. However, this is also the period when roads are often blocked by snow drifts and unavailable for wheeled travel. Therefore, the seasonal closure impact is expected to be minor to undetectable.

Cumulative Effects

The cumulative effects for the marten are discussed under the late seral closed canopy coniferous forest section. There are 477 miles of existing roads and motorized trails in marten habitat and 204 sq miles; therefore, there is a density of 2.3 mi/sq.mi of roads and motorized trails within the marten habitat.

Pacific Fisher – Affected Environment

The Pacific fisher is designated by the Regional Forester as a Sensitive Species. *Martes pennanti* is the only extant species of the fisher. On April 8, 2004, in a 12-month finding for a petition to list the west coast distinct population segment of the fisher, the USFWS added the fisher to the list of candidate species.

Fishers in the western United States are habitat specialists associated with mature and late-successional forests with an abundance of large trees, snags and logs (greater than 39 in), conifers and oaks with broken tops and cavities, coarse woody-debris, multiple canopy layers, high canopy closure and few openings (Aubry and Houston 1992; Buck et al. 1994; Buskirk and Powell 1994; Dark 1997; Freel 1991; Jones and Garton 1994; Powell and Zielinski 1994; Seglund 1995; Truex et al. 1998; Zielinski 1999). The fisher is among the most habitat-specific mammals in North America and changes in the quality, quantity and distribution of available habitat can affect their distributional range (Buskirk and Powell 1994). Forest type is probably not as important to fishers as the vegetative and structural aspects that lead to abundant prey populations and reduce their vulnerability to predation (Powell 1993).

California Wildlife Habitat Relationships (CWHR) structure classes 4M, 4D, 5M, 5D and 6 in ponderosa pine, montane hardwood-conifer, mixed conifer, montane riparian, aspen, red fir, Jeffrey pine, lodgepole pine, subalpine conifer and eastside pine have been identified as those most likely to provide suitable denning and resting fisher habitat (Freel 1991). Zielinski (pers. comm. 2006) minimized potential suitability of red fir, lodgepole pine, subalpine conifer and eastside pine habitats for use by fishers in the southern Sierra; therefore, the SNF modified the habitat classification to include CWHR types 4D, 5D and 6. In review with Zielinski (pers. comm. 2006), foraging definition was not applicable due to the generalist use of habitats by foraging fishers.

Part of the adaptive management conservation strategy for fisher (SNFPA, USDA 2001), a long-term status and trend monitoring program was implemented to assess fluctuations or declines in populations through time. The basic monitoring design and objective is to be able to detect a 20 percent decline in population abundance and habitat across the Sierra Nevada should it occur. This monitoring includes intensive sampling to detect population trends on the Sierra and Sequoia National Forests, where the fisher currently occurs, and is supplemented by less intensive sampling in suitable habitat in the central and northern Sierra Nevada specifically designed to detect population expansion. Based on this ongoing fisher population monitoring program, the portion of the southern Sierra fisher population occurring on the west slope of Sequoia National Forest has not shown changes in the observed occupancy rates from 2002 to 2008 (R. Truex 2009). These preliminary estimates are subject to change as the analysis continues, but it does not appear there has been a dramatic decline in either the observed occupancy rate or the spatial distribution of sites with detections, which include sites within the Greenhorn Mountains. Comparisons to survey data from the 1990s suggest that the occurrence for fisher may have expanded slightly in the southern Sierra during the past 10 years (R. Truex 2009).

The status and trend monitoring to date would suggest that current conditions (including existing motorized routes) have not led to decreases in fisher distribution or the index of occurrence. The monitoring data does not provide information regarding reproduction, and it is possible that the portions of the project area may actually be sink habitat being replenished by fishers dispersing from further north. However, the consistent detections of females within suitable habitat suggest this may be unlikely (pers. Com. R. Truex 2009).

In 2007, the Conservation Biology Institute developed a model predicting the probability of fishers occurring in areas of the southern Sierras (Spencer, et al. 2007). Table 3- 157 through Table 3- 161 displays, by each alternative, the miles of roads and motorized trails proposed for

addition by probability of fisher detection. The known maternal and natal den sites are in the following probability categories: 0-19 percent; 20-39 percent; 40-59 percent; 60-79 percent and 80-100 percent. As of 2009, there are seven, 700-acre areas established for the known den sites. There a total of 47 structures used as dens by reproductive female fishers ($n = 14$), including 18 natal dens, 28 maternal dens, and 1 unknown den (found late in the denning season) as of August 2009 (pers. comm. Purcell and Thompson 2009). Additional information can be found in the BE/BA (Sorini-Wilson, 2010).

The Southern Sierra Fisher Conservation area (SSFCA) is 720,609 acres across the SNF or 1108 square miles in size. There are 588,892 acres of the SSFCA in the analysis area, 306,488 acres of which are suitable habitat.

The standard and guideline # 87 for fisher den sites will be implemented which states “mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off-highway vehicle route, trail and road uses (including road maintenance). Evaluate proposals for new roads, trails, off-highway vehicle routes and recreational and other developments for their potential to disturb den sites.” There is a 700-acre buffer fisher den site designation which has been applied to known den sites. Currently, under Alternative 1, there are roads and motorized trails within the 700-acre den site buffer.

Pacific Fisher – Environmental Consequences

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the fisher. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to the NFTS within probability of fisher detection

In 2007, the Conservation Biology Institute developed a model predicting the probability of fishers occurring in areas of the southern Sierras (Spencer, et al 2007). This model was used to evaluate the effects of proposed road and motorized trail additions and Open Areas based on the probability of detecting fishers in that area.

- Number of roads and motorized trails in SSFCA
- Miles of roads and motorized trails in SSFCA
- Density in SSFCA

Adding roads and motorized trails to the NFTS has the potential to create direct and indirect effects to Pacific fishers, including reducing habitat quality and increasing the risk of collisions, disease and wildfire ignitions. Road and motorized trail-associated effects were measured at two scales. First, within the designated Southern Sierra Fisher Conservation Area, this encompasses the known occupied range of Pacific fishers in the Sierra Nevada and includes a variety of habitat types. As an additional measure of effects, the total miles of proposed roads and motorized trails in high suitability fisher habitat in the project area was also determined. High suitability fisher habitat was defined using the CWHR2.1 model, with classes 4M, 4D, 5M, 5D and 6 (stands with trees 11 inches diameter at breast height (DBH) or greater and greater than 40 percent cover) in Jeffrey pine, montane hardwood-conifer, Ponderosa pine, Sierran

mixed-conifer and white fir. Although fishers may forage in a wide range of habitats, these were viewed as most important to their survival.

- Miles of roads and motorized trails within 700-acre den site buffers
- Miles of roads and motorized trails within ¼ mile of den site buffers

The effects of the alternatives are analyzed for the impacts occurring in a “zone of influence” within ¼ mile of proposed roads and motorized trails. This “zone of influence” represents habitat fragmentation to fishers as it relates to habitat components, such as snag and down log removal along roads and motorized trails for public fuel wood and public safety hazards. It also is used as a rough measure of disturbance from noise. Absolute disturbance thresholds of concern for Pacific fishers have not been established, however, studies on other species indicate that noise disturbance may not be an important issue beyond ¼ mile (Delaney and Grubb 2001, 2003). Therefore, for this analysis, acres farther than ¼ mile from a roads and motorized trails were not considered to be subject to habitat fragmentation or disturbance by motor vehicles.

Direct and Indirect Effects

Gaines et al (2003) reviewed studies on the Pacific fisher and determined that road-associated factors that were likely to affect fishers were reductions in snags and down logs, edge effects, collisions, habitat loss or fragmentation, movement barrier and displacement or avoidance. In addition, the roads and motorized trails may influence the following factors that have been recently identified as concerns for Pacific fisher: route for competitors and predators, disease transmission, and habitat loss to wildfires (MacFarlane 2009).

Collisions: As road density increases there is increased opportunity for wildlife/vehicle collisions. Collisions with vehicles are known to be a source of mortality for Pacific fishers (Heinemeyer 1993, USDI 2004). Paved roads where vehicles can travel at high speeds are probably more likely to have collisions than where speeds are lower. Collision related mortality on the SNF has been reported, but the frequency this occurs in the project area is unknown. To date there have been three fisher that were killed on major highways (Highways 168 and 41).

Reduction in snags and down logs: Hazard tree removal occurs along existing system roads and motorized trails in the project area and would be expected to occur along roads and motorized trails added to the NFTS. The impacts are variable depending on the type of road or motorized trail, accessibility of the area and habitat type. (Wider roads and motorized trails open to all type of vehicles in heavily forested areas would be expected to have more hazard trees removed than single track trails in areas with only small trees). High levels of coarse woody debris (snags, downed logs, root masses, large branches) are an essential component of fisher habitat, and are utilized for rest and den sites. Activities that remove coarse woody debris are therefore likely to lower habitat suitability (Buskirk and Ruggiero 1994). Connected actions along roads and motorized trails include the need to remove down logs when blocking trails. These influences would likely not extend more than 300 feet from the actual road and motorized trail.

Disturbance: The linear effects of travel on roads and motorized trails can include disturbance, displacement and microclimate changes (Gaines et al., 2003). Disturbance can lead to physiological responses such as increased stress hormones (Wasser et al. 1997 as reported in Gaines et al., 2003).

Habitat loss, fragmentation and edge effects: Habitat connectivity is a key to maintaining fishers within a landscape. Roads in general contribute to habitat fragmentation, a reduction in habitat connectivity and potential for road kill of fishers and their prey. Noise, dust and associated

disturbance will be site specific and relatively short-term, but may extend into adjacent forest areas. Some research literature suggests that the loss and fragmentation of suitable habitat by roads and route proliferation may have played a role in the reduction of the fisher from the central Sierra Nevada and its failure to re-colonize there (USDI 2004). Large highways in this region such as Highway 80 in the central Sierra Nevada are of sufficient width and traffic volume to potentially represent a barrier to movement.

In general, fishers use forest or woodland landscape mosaics that include conifer-dominated stands and avoid entering Open Areas that have no overstory or shrub cover (Buskirk and Powell 1994). They select forests that have low and closed canopies. Late-successional coniferous or mixed forests provide the most suitable fisher habitat because they provide abundant potential den sites and preferred prey species (Allen 1987).

Habitat modification resulting from the removal of near ground vegetation and coarse woody material appears to be the primary potential effect of adding roads and motorized trails to the NFTS. There are two ZOIs used for fisher. The 700 acre den site buffer was used, in addition to the standard ¼ mile, because there are 18 natal dens and 28 maternal dens and one unknown den as of August 2009 on the SNF. Also the 700 acre buffer is management direction from the SNFPA 2004.

Displacement or Avoidance: The degree to which road and motorized trail density and noise disturbance influence how fisher utilize habitat are not well understood. Review of the research literature suggests that fisher commonly move through habitats that contain roads and trails, where at least some ambient level of noise disturbance appears to be tolerated.

The level of route density and associated noise disturbance may influence how fisher utilize available habitat. This notion seems to be supported by a few recent studies that imply that fisher may favor occupancy of landscapes with lower road use or road density. Dark (1997, *In* USDI 2004), for example, studied fisher in a well-roaded study area (i.e. areas without roads did not exist) on the Shasta-Trinity National Forest. Results suggested that fisher were detected more frequently at sites where roads were closed by the use of gates or otherwise designed to discourage vehicular traffic. Fishers used habitats with a greater density of low-use roads, and favored landscapes with more contiguous, unfrequented forests and less human activity. Campbell (2004, *In* USDI 2004) noted that sample units examined within the central and southern Sierra Nevada region occupied by fisher were negatively associated with road density. This relationship was significant at multiple spatial scales (from 494 to 7,413 acres).

Route for competitors and predators: Roads and motorized trails may provide access for competitors or predators that would not have existed otherwise. Habitat alterations favoring bobcats, mountain lions or coyotes could increase fisher mortalities (Macfarlane 2009).

Disease Transmission: Increased access provided by roads and motorized trails can provide an avenue for disease carried by domesticated animals, especially dogs, to spread to fisher. Canine distemper, parvoviruses and canine infectious hepatitis are all diseases associated with fisher (Brown et al. 2008) that may be transmitted by domestic dogs.

Habitat Loss to Wildfires: Uncharacteristically severe wildfire ranked as a high threat to fisher habitat in the southern Sierra Nevada (West Coast Fisher Conservation Assessment, in prep.). Increased access to fisher habitat provided by more roads and motorized trails may increase the likelihood of wildfire ignitions.

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative. Therefore, it is assumed the route proliferation would

continue over the short and long term and the effects of the unauthorized routes would be similar to those discussed under adding roads and motorized trails to the NFTS. Under Alternative 1, there are 2.9 miles of unauthorized routes that are within the 700 acre den site buffers (See Table 3- 157).

The amount of habitat affected is determined by the zone of influence (within ¼ mile) from the 700-acre den site buffer. Alternative 1 would have the greatest impact to fisher habitat because it has the largest number of roads and motorized trails open to the public, highest road density and would allow motor vehicle travel in all high suitability fisher habitat (Table 3- 157). There are 461 miles of unauthorized routes in the SSFCA under Alternative 1.

Although occasional direct mortality may occur from collisions with off-road vehicles, this appears to be an exceedingly rare event for the fisher and has not been reported to occur within the Forest. The mortalities that have occurred were on major highways (Highways 168 and 41). It is possible this could occur under this alternative; however, given existing use and mobility of the species within this group, such occurrences would remain rare and inconsequential to species population dynamics. At the long-term analysis point, it is assumed the rate of off-highway vehicle use will remain the same or have minimal change.

Included in cross-country travel are the effects from continuation of use on 552 miles of unauthorized routes and 125 acres of Open Areas, would continue to contribute to direct and indirect impacts to the SSFCA.

A larger impact, both in the short term and the long term, would be disturbance that would cause individuals to move or alter behavior. This alternative would provide potential disturbance to fisher. The amount of disturbance that would affect any of the species is dependent on vehicle use, with more vehicles potentially being more disturbances. The information discussed below addresses fisher indicators.

Table 3- 157. Fisher Indicators – Alternative 1

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within probability of fisher detection	0-19 percent = 326.0 20-39 percent = 45.4 40-59 percent = 102.6 60-79 percent = 59.2 80-100 percent = 24.4
Number of roads and motorized trails in SSFCA	461 roads and motorized trails
Miles of roads and motorized trails in SSFCA	70.4 miles of roads and motorized trails
Density in SSFCA	0.07 mi/sq. mi
Miles of roads and motorized trails in fisher habitat	20.2 miles
Density in fisher habitat	0.12 mi/sq.mi
Miles of roads and motorized trails within 700 acre den site buffers	2.9 miles
Miles of roads and motorized trails within ¼ mile of den site buffers	0.83 miles/7 roads and motorized trails

Effects Due to Additions to the NFTS: There are no roads and motorized trails or Open Areas proposed for addition to the NFTS under this alternative; therefore, there will be no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the current season of use on NFTS roads and motorized trails. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on fisher within the zone of influence for the species and associated habitat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to the species within this group by prohibiting cross-country travel. In the long term (20 years), fisher habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The fisher would not be affected by disturbance, trampling or indirect impacts to prey or food resources from cross-country vehicle travel.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails are proposed for addition to the NFTS. Table 3- 158 displays the proposed roads and motorized trails within habitats used by the species. The addition of 44 miles of roads and motorized trails could affect fisher because there would be noise disturbance to the species. This alternative would contain 92 percent less roads and motorized trails (44/552) than Alternative 1.

Actions proposed in this alternative would result in some indirect effects through habitat modification. The addition of roads and motorized trails to the NFTS within preferred fisher habitat would result in minor amounts of habitat fragmentation. Since the majority of these roads and motorized trails are narrow native surfaced routes, they would only result in minor reductions in overhead cover and would not significantly reduce fisher movement between habitat patches.

There are 3.4 miles of roads and motorized trails to be added within the 60-100 percent probability under this alternative. At this time, there are no known den sites that are intersecting with the roads, motorized trail, or Open Areas that are proposed for this alternative. There are 130 roads and motorized trails proposed for addition to the NFTS under this alternative within the SSFCA, which is approximately 0.40 mi/sq mi. There are 11.62 miles of routes that are within fisher habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Under this alternative, there are changes to the seasonal open period for 986 miles of roads and motorized trails. Compared to Alternative 1, there would be 446 versus 236 miles closed year-round, and 986 miles versus 470 seasonally closed. These areas would have minimal disturbance from vehicles during the closure periods. Since the closure periods associated with SW-1 will cover winter and early spring, early denning activities may have fewer disturbances. However, this is also the period when roads and motorized trails are often blocked by snowdrifts and unavailable for wheeled travel. Therefore, the impact is expected to be variable by year and minor to undetectable. Closure and removal of roads has been found to effectively provide wildlife security and increase the amount of available wildlife habitat (Wildlands CPR 2006).

Table 3- 158. Fisher Indicators – Alternative 2

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within probability of fisher detection	0-19 percent = 29.7 20-39 percent = 4.0 40-59 percent = 5.4 60-79 percent = 3.4 80-100 percent = 3.4
Number of roads and motorized trails in SSFCA	130 roads and motorized trails
Miles of roads and motorized trails in SSFCA	44 miles of roads and motorized trails
Density in SSFCA	0.040 mi/sq. mi
Miles of roads and motorized trails in fisher habitat/acres	11.62 miles = 7437 acres
Density in fisher habitat	0.069 mi/sq. mi.
Miles of roads and motorized trails within 700 acre den site buffers	0 miles
Miles of roads and motorized trails within ¼ mile of den site buffers	0 miles

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Effects Due to Additions to the NFTS: Under this alternative, there would be no new roads, motorized trails or Open Areas (Table 3- 159) proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to fisher.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS; therefore the effects are the same as Alternative 1.

Table 3- 159. Fisher Indicators – Alternative 3

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within probability of fisher detection	0-19 percent = 0 20-39 percent = 0 40-59 percent = 0 60-79 percent = 0 80-100 percent = 0
Number of roads and motorized trails in SSFCA	0 roads and motorized trails
Miles of roads and motorized trails in SSFCA	0 miles of roads and motorized trails
Density in SSFCA	0 mi./sq. mi
Miles of roads and motorized trails in fisher habitat	0 miles
Density in fisher habitat	0 mi./sq.mi.
Miles of roads and motorized trails within 700 acre den site buffers	0 miles
Miles of roads and motorized trails within ¼ mile of den site buffers	0 miles

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance or indirect impacts to prey or food resources to the fisher by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The potential impacts discussed under Alternative 1 from cross-country travel would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 42 miles of motorized trails and 9 miles of roads are proposed for addition to the NFTS. These additions would have a minimum impact on the fisher because this alternative has the least number of additions to the NFTS. There are 11 Open Areas that will be added under this alternative. However, there is the potential that the fisher may not utilize the area because of noise disturbance. If the fishers leave the area it could cause them to expend more energy.

When comparing Alternative 4 (Table 3- 160) to Alternative 1, there is a decrease in the number of roads and motorized trails added to the system; therefore, within fisher habitat, there would be a decrease in direct or indirect effects to fisher. These decreases would result in fewer individuals being impacted and less habitat being fragmented as well as less noise disturbance.

Under this alternative, there are 5.7 miles of proposed additions to the NFTS within the 60-79 percent probability and 3 miles of routes proposed for addition to the NFTS within the 80-100 percent probability. At this time, there are no known den sites that are intersecting with proposed additions to the NFTS or Open Areas in this alternative. There are 23 roads and motorized trails proposed for addition to the NFTS under this alternative within the SSFCA, which are approximately 0.37 mi/sq mi.

There would be some effects to fisher, such as noise disturbance or displacement, because of roads being opened. However, as shown in Table 3- 158 through Table 3- 161 there are no roads or motorized trails within the den site buffers, which are core areas, used by fishers. There are 5.67 miles of roads and motorized trails to be added that are in fisher habitat.

There is one Open Area (Blucyn152) out of eleven that is within fisher habitat but resides in the 0-19 percent probability of finding a fisher in the area according to the CBI model.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads) Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Alternative 4 would close year-round use on 552 miles of NFTS roads and motorized trails. This is opposed to the 236 currently prohibited. Currently, there are 470 miles seasonally closed; however, under this alternative there would be 1568 miles seasonally closed. These changes would incorporate the roads to be closed during the important time periods for species. These areas would result in no disturbance from vehicles during the closure periods. Since the closure periods coincide with Resource Issue Code SW-1, it covers winter and early spring, early denning activities may have fewer disturbances. However, this is also the period when roads are often blocked by snow drifts and unavailable for wheeled travel. Therefore, the seasonal closure impact is expected to be minor to undetectable.

Table 3- 160. Fisher Indicators – Alternative 4

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within probability of fisher detection	0-19 percent = 21.8 20-39 percent = 5.0 40-59 percent = 14.3 60-79 percent = 5.7 80-100 percent = 3.0
Number of roads and motorized trails in SSFCA	125 roads and motorized trails
Miles of roads and motorized trails in SSFCA	46 miles of roads and motorized trails
Density in SSFCA	0.042 mi/sq. mi
Miles of roads and motorized trails in fisher habitat/acres	5.67 miles = 3629 acres
Density in fisher habitat	0.033 mi/sq. mi.
Miles of roads and motorized trails within 700 acre den site buffers	0 miles
Miles of roads and motorized trails within ¼ mile of den site buffers	0 miles

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to the species within this group by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 85 miles of roads and motorized trails and 20 Open Areas equivalent to 105 acres are proposed for addition to the NFTS. Under this alternative, there would be the potential for the greatest effect because there are the most roads and motorized trails open within the SSFCA which in turn could be the greatest noise disturbance to the fisher. In addition, there are 9.3 miles in the 60-79 percent probability and 5.4 miles of roads and motorized trails within the 80-100 percent probability of detection added to the system, however none of the current known den sites are in these areas. There are three Open Areas (Blucyn 4, Blucyn 6 and Blucyn152) that are in fisher habitat; however they are in the 0-19 percent probability according to the CBI model. There are 15.4 miles of roads and motorized trails that will be added within fisher vegetation.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Miles of NFTS roads and motorized trails to be prohibited would be 418. This is opposed to the 236 currently prohibited. Currently, there are 465 miles of seasonal closures; however, under this alternative there would be 1,626 miles of seasonal closures. These changes would incorporate the roads to be closed during the important time periods for the fisher. These areas would have no disturbance from vehicles during the closure periods. Since the closure periods are associated with the Resource Issue Code SW-1 (covers winter and early spring), early denning activities may have fewer disturbances. However, this is also the period when roads and motorized trails are often blocked by snow drifts and unavailable for wheeled travel. Therefore, the seasonal closure impact is expected to be minor to undetectable.

Table 3- 161. Fisher Indicators – Alternative 5

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within probability of fisher detection	0-19 percent = 41.5 20-39 percent = 7.5 40-59 percent = 21.6 60-79 percent = 9.3 80-100 percent = 5.4
Number of roads and motorized trails in SSFCA	213 roads and motorized trails
Miles of roads and motorized trails in SSFCA	80 miles of roads and motorized trails
Density in SSFCA	0.073 mi/sq. mi
Miles of roads and motorized trails in fisher habitat/acres	15.46 miles = 9600 acres
Density in fisher habitat	0.091 mi/sq. mi.
Miles of roads and motorized trails within 700 acre den site buffers	0 miles
Miles of roads and motorized trails within ¼ mile of den site buffers	0 miles

Cumulative Effects

The cumulative effects geographic boundary for Pacific fishers is the section of Southern Sierra Fisher Conservation Area within the travel management project area. This is an appropriate scale for determining cumulative effects to Pacific fishers, since this 588,892 (portion within analysis area) acre area is sufficiently large to include many fisher home ranges, and encompasses the known range of fishers within the project area. In addition, the project area encompasses an array of habitat conditions from low elevation to high elevation, including several vegetation types from Sierran mixed conifer, ponderosa pine, red fir, and Jeffrey pine.

Table 3- 162. Cumulative Miles of Roads and Motorized Trails Proposed for Addition to the NFTS

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Miles of roads in SSFCA	2337	2337	2337	2337	2337
Miles of roads within 700 acre den site buffer	38+2.9=40.9mi	25.9+0=25.9mi	27.7+0=27.7mi	27.7+0=27.7mi	27.7+0=27.7
Miles of prohibited roads within 700 acre den site buffer	0	12	12	8	8
Miles of roads within ¼ mi den site buffer	15	15	15	15	15
Miles of prohibited roads within ¼ mi den site buffer	0	5	5	3	3
Number of dens (across Forest) affected by current roads	47	41	41	41	41
Miles of roads in Fisher Habitat*	3000 (557 unauthorized routes)	3000	3000	3000	3000

*road miles are the same because the differences show between seasons of use

Table 3- 163 Miles of Roads and Motorized Trails Proposed for Addition to the NFTS within Probability of Fisher Detection in Analysis Area

Probability of Fisher Detection in Analysis Area (acres per class)	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
0-19% (463,140 acres in this class)	326	29.7	0	21.8	41.5
20-39% (65,799 acres in this class)	45.4	4	0	5	7.5
40-59% (112,530 acres in this class)	102.6	5.4	0	14.3	21.6
60-79% (112,530 acres in this class)	59.2	3.4	0	5.7	9.3
80-100% (59,510 acres in this class)	24.4	3.4	0	5.4	5.4

When considering the cumulative effects of all roads and motorized trails, Alternative 1 (current condition) has the greatest cumulative miles of roads and motorized trails (2375 miles) within the SSFCA in the project area, and therefore, poses the greatest overall potential risk and cumulative impacts to fishers. Under Alternative 1, given the magnitude of potential effects upon unknown fisher den sites that may exist and foraging habitat it may cause adverse effects to fisher populations. Because Alternative 1 does not prohibit public motor vehicle cross-country travel, there is a high degree of uncertainty about future route proliferation and associated cumulative impacts upon fishers.

Alternative 5 has the next highest cumulative impacts to fishers, with a cumulative total of 85.3 miles of motorized roads and motorized trails (Table 3- 161). Alternative 3 has the lowest cumulative impacts to fishers, with 0 miles of roads and motorized trails being added. Existing roads and motorized trails would be the sole impact. Table 3- 163 displays the cumulative miles of roads and motorized trails in high suitability fisher habitat.

ROUTE DENSITY IN HIGH SUITABILITY FISHER HABITAT

Route density effect thresholds for Pacific fishers are not readily available in the literature; however, Freel (1991) developed general road density guidelines, based on a compilation of best available science and specialist knowledge of fishers and their habitat use. The Freel model estimated that high capability habitat had road densities below 0.5 miles per square mile and moderate capability habitat had road densities from 0.5 to 2.0 miles per square mile. Values higher than 2.0 miles per square mile are considered low capability habitat and were anticipated to negatively influence this species. This model was based on information from other species, not specifically on Pacific fisher research.

CUMULATIVE EFFECTS OF ROADS AND MOTORIZED TRAILS ON PACIFIC FISHERS WITHIN THE ZONE OF INFLUENCE

When analyzing the cumulative effects to acres of the SSFCA within ¼ mile of a road or motorized trail, Alternative 1 has the highest cumulative impact. This alternative allows motorized travel throughout the SSFCA. Alternative 3 has the lowest cumulative impacts to acres in the SSFCA. Prohibited ZOI in ¼ mile fisher den buffer is 1797 acres for Alternative 2, 1435 for Alternative 4 and 5.

OVERALL CUMULATIVE EFFECTS FROM PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Table 3- 166 provides a summary of past, present, and reasonably foreseeable projects within high suitability fisher habitat in the travel management project boundary.

Past, present and future vegetation management projects affect less than 1 percent of high suitability fisher habitat in the project area. The negative effects of these projects are short-term, while the long-term cumulative effects are mostly beneficial to fisher (reducing the risk of stand-replacing wildfires). Wildfires have impacted around 5 percent of the suitability fisher habitat within its range. Moderate intensity fires have short term negative impacts, but are beneficial to fisher habitat in the long term.

All the action alternatives provide benefits over Alternative 1 by eliminating the negative effects of cross-country travel and reducing the number of unauthorized routes currently in the Southern Sierra Fisher Conservation Area and high suitability fisher habitat. Under the action alternatives, roads and motorized trails affect 9 percent of fisher habitat (9600 acres of suitable fisher habitat affected by roads and motorized trails per 107,523 of suitable fisher habitat acres) (Table 3- 161). Most of this impact is from existing system roads and motorized trails, with new additions to the NFTS contributing a relatively small amount in the alternatives. The effects of roads and motorized trails on fisher habitat are negative in both the short and long term by causing a reduction in habitat quality due to disturbance and fragmentation. However, given that two studies (Purcell and Thompson 2009 and Truex 2009) across the forest found female fishers successfully reproducing in areas with road and motorized trail densities far above that proposed in the action alternatives. Therefore, it is unlikely that this reduction in habitat quality will reduce the viability of the fisher population in the project area.

Late Seral Open Canopy Coniferous Forest Habitat– Affected Environment

Late seral open canopy coniferous forest on the SNF is composed of ponderosa pine, Sierran mixed conifer, white fir, and red fir stands that contain primarily medium to large trees (equal to or greater than 24 inches dbh) with canopy closures less than 40 percent. The entire analysis area contains about 2,098 acres of late seral open canopy coniferous forest habitat. About 1,652 of them are currently open to cross-country motorized travel. About 0.7 miles of unauthorized routes (encompassing 348 ZOI acres) were created by users within this habitat. About 0.3 of these miles (encompassing 64 ZOI acres) exist in areas where motorized cross-country travel is currently prohibited. (See Figure 1-3 for a map of those areas). About 7 miles of NFTS roads and motorized trails, private roads, and other public roads (state, county, other federal) (encompassing 1,410 ZOI acres) exist in late seral open canopy coniferous forest habitat within the analysis area. Including the roads, motorized trails, and unauthorized routes, the habitat has a route density of 2.67 mi./sq.mi. No managed Open Areas exist within the habitat, but about 0.6 acres of unauthorized Open Areas do. About 0.3 acres of the unauthorized Open Areas exist in prohibited areas. Overall, about 1,759 acres of late seral open canopy coniferous forest habitat is impacted by roads, motorized trails, and Open Areas. Nevertheless, because 1.3 miles of roads and motorized trails (encompassing 374 ZOI acres) in the habitat are closed year-round, acres of late seral open canopy habitat taken out of effective MIS use are closer to 1,385 or 66 percent.

Late Seral Open Canopy Coniferous Forest Habitat – Environmental Consequences

Direct and Indirect Effects

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the habitat. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Acres of habitat available
- Acres of habitat open for cross-country motorized use
- Miles of unauthorized routes within the habitat, and acres of habitat encompassed by a ¼ mile ZOI
- Miles of NFTS, private, other public roads and motorized trails within the habitat, and acres of habitat encompassed by a ¼ mile ZOI
- Total density of roads, motorized trails and unauthorized routes that could continue to have use within the habitat
- Acres of Open Areas (FS managed and unauthorized) within the habitat

ALTERNATIVE 1 – NO ACTION

Effects due to Continued Cross-country Motor Vehicle Travel: Under the No Action alternative, 1,652 acres of late seral open canopy coniferous forest habitat would remain open for motorized cross-country travel. Occasional cross-country travel through habitat types on the SNF would not generate lasting impacts upon the habitats, nor would MIS likely avoid using areas that are only occasionally accessed by motor vehicles. However, where cross-country travel occurs in the same vicinity regularly, unauthorized routes and Open Areas are generated and impacts upon habitat and MIS use of habitat occurs. Under this alternative, cross-country travel would not be prohibited. It is assumed that the proliferation of unauthorized routes and Open Areas would continue and the effects would be similar to those discussed under adding roads, motorized trails, and Open Areas to the NFTS. There would be continued use of about 0.5 miles of unauthorized routes and 0.3 acres of unauthorized Open Areas in late seral open canopy habitat within the project area under this alternative.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails, or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS; therefore, there would be no direct or indirect effect to the habitat. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effect upon late seral open canopy coniferous habitat effectiveness.

ALTERNATIVE 2 – PROPOSED ACTION

Effects due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and 6 acres of Open Areas are proposed for addition to the NFTS. Of the 44 miles added, 0.01 mile is within late seral open canopy coniferous forest habitat. None of the Open Areas to be added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Under this alternative, mileage of roads and motorized trails closed year-round would increase by about 0.3, increasing the amount of roads and motorized trails closed year-round in the habitat by 19 percent. Human-caused disturbances are decreased immediately upon closure of roads and motorized trails. Nest parasitism, nest predation, and other edge effects are decreased once prohibited roads and motorized trails (roads and motorized trails closed year-round) become overgrown with vegetation. Thus, for the analysis of MIS, acres of habitat impacted by roads and motorized trails that are closed year-round will not be considered adversely affected.

Note: Habitat along roads and motorized trails that are seasonally closed during breeding seasons would have decreased human-caused disturbance, but nests would still be subject to increased nest predation and parasitism. Therefore, even though the impact is less, acres of habitat impacted by seasonally closed roads and motorized trails will still be considered adversely affected. This rationale is true for other MIS habitats and will not be addressed again, except for deer (as explained under the Ungulate section).

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails, or Open Areas are proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads). Under this alternative, there would be no changes to the NFTS. Effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas, and NFTS, private, and other public roads and motorized trails. The effects are the same as described in Alternative 2. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of roads and motorized trails and 37 acres of Open Areas are proposed for addition to the NFTS. Of the 51 miles added, approximately 0.1 mile is within late seral open canopy coniferous forest habitat. None of the Open Areas to be added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. Under this alternative, mileage of roads and motorized trails closed year-round would increase by about 0.7, increasing the amount of roads and motorized trails closed year-round in the habitat by 35 percent.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas, and NFTS, private, and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 85 miles of roads and motorized trails and 105 acres of Open Areas are proposed for addition to the NFTS. Of the 85 miles added, approximately 0.2 mile is within late seral open canopy coniferous forest habitat. None of the Open Areas to be added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. Under this alternative, mileage of roads and motorized trails closed year-round would increase by about 0.5, increasing the amount of roads and motorized trails closed year-round in the habitat by 28 percent.

Late Seral Open Canopy Coniferous Forest Habitat - Cumulative Effects

Note: Per direction in the LRMP, as amended by the SNF Bioregional MIS Report, determinations of project-level species impacts are not made for MIS. Instead a relationship of project-level habitat impacts to bioregional-scale habitat and population trends is provided for MIS.

As discussed above, roads, motorized trails, and Open Areas located within ¼ mile of the habitat likely increase: (1) nesting, resting, and foraging disturbance; (2) nest predation; and/or (3) habitat avoidance. Those impacts are most significant during the reproductive seasons and may reduce reproductive success. Reproductive season for the sooty grouse occurs from early April to late August. The periods of greatest sensitivity occurs during nest building and incubation when the individual is more likely to abandon the site (Gotmark 1992 in Knight and Gutzwiller 1995). Another period of sensitivity is the nestling/fledgling period since parental attentiveness may be disturbed; thereby, disrupting feeding patterns and increasing the chance that young may become stressed and/or predated upon.

The higher the road and motorized trail density, the greater the amount of habitat is taken out of effective MIS use. When route density exceeds a certain point, the habitat does not provide any place for undisturbed reproduction, foraging, or resting to occur. If route density remains too high, habitat is likely avoided. Species population can be reduced as a result. Existing motorized travel has created a route density of 2.76 mi./sq.mi within late seral open canopy coniferous forest habitat and has likely impacted as much as 66 percent of late seral open canopy habitat within the analysis area it by decreasing their effectiveness for MIS. A comparison of route densities and percent habitat impacted is provided in the table below.

Other activities within the analysis area cumulatively affect the habitat. There are 28 active cattle allotments, encompassing about 743,247 acres, and permitting 17,000 AUMs within the analysis area. Some of the cattle allotments encompass late seral open canopy coniferous forest habitat. CDFG (2005 *In* USDA-FS 2008) lists heavy grazing as one of the four major factors that may impact sooty grouse populations. Sooty grouse forage on shrubs, grasses, and coniferous trees; plucking off seeds and insects in the summer, and needles, buds, cones, and twigs in the winter (Ibid). Cattle may compete with sooty grouse for food in open canopy coniferous forest habitats since such stands provide grasses, forbs, and shrubs for forage in the understory. Furthermore, cattle may crush nests. Nevertheless, this is not likely the case under normal grazing practices. Cattle tend to utilize meadows and grasslands over coniferous habitat since they provide a greater amount of food, but if overgrazing is occurring, cattle would move into the understory of open stands searching for food. Grazing is limited on the SNF by standards and guidelines (S&Gs). Therefore, it is assumed that cattle would not significantly impact the quality of late seral open canopy coniferous forest habitat for MIS. The LRMP amendment (1995) limits use of woody shrubs to 20 percent annual leader growth when rangeland is in satisfactory condition and 10 percent if in unsatisfactory condition (USDA-FS 1995b, p. 2-15). SNFPA (2004a) S&G #121 limits browsing to no more than 20 percent of annual leader growth of mature riparian shrubs and no more than 20 percent in individual seedlings. In addition, livestock are to be removed from areas when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody vegetation. SNFPA (2004a) S&G #120 limits livestock utilization of grass and grass-like plants to 30 percent (or a minimum 6-inch stubble height) in early seral meadows; and 40 percent (or a minimum 4-inch stubble height) in late seral meadows. It also requires ecological status to be determined in key areas every 3 to 5 years. If the area is in a downward trend, grazing has to be modified or suspended. Degraded meadows, such as those in early seral status with greater than 10 percent bare soil, have to be rested from grazing until they have recovered and have moved to mid or late seral status.

CDFG (2005 *In* USDA-FS 2008) lists newly cut timber sales as another factor that may impact sooty grouse populations. Not only are trees removed, but much of the understory vegetation is disturbed with timber management activities. Therefore, food supply is temporarily depleted and nests may be crushed. About 492 acres or 23 percent of late seral open canopy coniferous forest habitat have been or will be impacted by timber management activities within the analysis area. Nevertheless, impact is only for about a year since understory grasses and shrubs typically recover in that timeframe. Therefore, any habitat impacted in the past would have recovered. Few if any of the recent timber sales are or will be clearcuts and overstory trees would remain, providing sooty grouse with needles, buds, cones, and twigs for foraging opportunities. Therefore, it is assumed that while present and foreseeable timber management activities may directly impact sooty grouse by crushing nests, they will not significantly impact the quality of their habitat.

About 50,806 acres of plantations exist within the analysis area; however, none are in late seral open canopy coniferous forest habitat.

CDFG lists prescribed burns as another factor that may impact sooty grouse populations. Only about 157 acres or 7 percent of late seral open canopy coniferous forest habitat within the analysis area have/will be impacted by prescribed burns. Because burned shrubs and grasses typically recover in less than a year, impact of prescribed burns upon the habitat and sooty grouse is not anticipated to be significant.

Only about 27 acres or 1 percent of late seral open canopy coniferous forest habitat has been impacted by wildfires within the analysis area; and due to the openness of the habitat few additional acres are anticipated to burn within the foreseeable future. Therefore, impact of wildfire upon the habitat and sooty grouse is assumed to be insignificant.

Table 3- 164 below summarizes the differences that would occur within late seral open canopy habitat under each alternative.

Table 3- 164. Indicators per Alternative for Late Seral Open Canopy Coniferous Forest Habitat

	Acres Open to Motorized Cross-country Travel	Miles of NFTS Roads and Motorized Trail and other Private/ Public Roads and Motorized Trail (added miles included in total above)	Miles of NFTS Roads and Motorized Trails Closed Year-Round	Miles of Unauthorized Routes that Can Receive Motorized Travel	Density of Roads and Motorized Trails that Can Receive Use (mi./sq. mi.)	Acres of Managed Open Areas (added Open Areas included in total above)	Acres of Unauthorized Open Areas that Can Receive Motorized Travel	Acres and Percent Habitat Impacted by a Decrease in Effectiveness for MIS
Alt1	1,652	7 (+0)	1.3	0.5	2.50	0 (+0)	0.3	1,320 = 63%
Alt2	0	7 (+0)	1.6	0	2.33	0 (+0)	0	879 = 42%
Alt3	0	7 (+0)	1.3	0	2.33	0 (+0)	0	1,036 = 49%
Alt4	0	7 (+0)	2.0	0	2.33	0 (+0)	0	847 = 40%
Alt5	0	7 (+0)	1.8	0	2.33	0 (+0)	0	978 = 47%

Relationship of Late Seral Open Canopy Coniferous Forest Habitat to MIS

Sooty Grouse

The MIS chosen for this habitat type is the sooty grouse. Sooty grouse occurs in open, medium to mature-aged stands of fir, Douglas-fir, and other conifer habitats, interspersed with medium to large openings, and available water, and occupies a mixture of mature habitat types, shrubs, forbs, grasses, and conifer stands (CDFG 2005). Empirical data from the Sierra Nevada indicate that Sooty (blue) Grouse hooting sites are located in open, mature, fir-dominated forest, where particularly large trees are present (Bland 2006).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trend

As determined in the MIS Report for Travel Management (Strand and Sanchez 2010), current motorized travel on the SNF is affecting up to 1,385 acres of late seral open canopy coniferous forest habitat or 2 percent of the acres available within the Sierra Nevada bioregion. Affected acres were derived by summing the acres of habitat impacted by existing and added roads, motorized trails and Open Areas. As reasoned in the MIS Report, acres of habitat that are only occasionally traversed by cross-country travel (i.e. no unauthorized routes exist) were not included in the calculation of affected acres. Acres of habitat impacted by roads and motorized trails were derived by placing a ¼ mile buffer along all roads and motorized trails that are open either year-round or seasonally. Roads and motorized trails that are closed year-round were not included in the calculation of affected acres, as reasoned in the MIS Report. A ¼ mile buffer is conservative and likely overestimates the percent of habitat affected. Therefore, it is likely that less than 2 percent of the habitat within the Sierra Nevada bioregion has likely been affected by motorized travel on the SNF. As such, motorized travel on the SNF has not likely affected habitat at a bioregional level, nor has it likely affected the distribution of sooty (blue) grouse across the bioregion.

The alternatives would continue to directly, indirectly, and cumulatively affect up to 847 acres of late seral open canopy coniferous forest habitat (lowest) under Alternative 4, and 1,320 acres (highest) under the No Action Alternative. As explained above, the acres affected would likely be less. The Travel Management Plan would **not** result in a change of: (1) habitat acres; (2) canopy cover class; or (3) CWHR size class. However, effectiveness of the habitat would be impacted due to: (1) human disturbance, (2) edge effects, and (3) habitat avoidance and abandonment. Nevertheless, because the acres affected would be less than 2 percent of the total Sierra Nevada-wide acreage, none of the alternatives would likely affect habitat at the bioregional level, nor would they likely affect the distribution of sooty grouse across the Sierra Nevada bioregion.

Late Seral Closed Canopy Coniferous Forest Habitat – Affected Environment

Late seral closed canopy coniferous forest on the SNF is composed of ponderosa pine, Sierran mixed conifer, white fir, and red fir stands that contain primarily medium to large trees (equal to or greater than 24 inches dbh) with canopy closures greater than 40 percent. The entire analysis area contains about 66,373 acres of late seral closed canopy coniferous forest habitat. About 58,731 of them are currently open to cross-country motorized travel. About 36 miles of unauthorized routes (encompassing about 18,406 ZOI acres) exist by users within this habitat. About 1.5 of these miles was created in areas where motorized cross-country travel is currently prohibited. (See Figure 1-3 for a map of those areas). About 247 miles of NFTS roads and

motorized trails, private roads, and other public roads (state, county, other federal) (encompassing about 47,967 ZOI acres) exist in late seral closed canopy coniferous forest habitat within the analysis area. Including the roads, motorized trails, and unauthorized routes, the habitat has a route density of 2.72 mi./sq.mi. About 1.2 acres of managed Open Areas and 17 acres of unauthorized Open Areas exist within the habitat. About 1.6 acres of the unauthorized Open Areas exist in prohibited areas. Overall, about 66,391 acres of late seral closed canopy coniferous forest habitat is impacted by roads, motorized trails and Open Areas. Nevertheless, because about 27 miles of roads and motorized trails (encompassing 10,455 ZOI acres) are closed year-round to vehicular traffic (except for necessary administrative use), the acres of late seral closed canopy coniferous forest habitat impacted is likely closer to 55,936 or 84 percent.

Late Seral Closed Canopy Coniferous Forest Habitat – Environmental Consequences

Direct and Indirect Effects

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the habitat. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Acres of habitat available
- Acres of habitat open for cross-country motorized use
- Miles of unauthorized routes within the habitat, and acres of habitat encompassed by a ¼ mile zone of influence (ZOI)
- Miles of roads and motorized trails (NFTS, private, other public) within the habitat, and acres of habitat encompassed by a ¼ mile ZOI
- Total road and motorized trail density (NFTS, private, other public, and unauthorized routes that could receive use) within the habitat
- Acres of Open Areas (FS managed and unauthorized) within the habitat

ALTERNATIVE 1 – NO ACTION

Effects due to Continued Cross-country Motor Vehicle Travel: Under the No Action alternative, 58,731 acres of late seral closed canopy coniferous forest habitat would remain open for motorized cross-country travel. Occasional cross-country travel through habitat types on the SNF would not generate lasting impacts upon the habitats, nor would MIS likely avoid using areas that are only occasionally accessed by motor vehicles. However, where cross-country travel occurs in the same vicinity regularly, unauthorized routes and Open Areas are generated and impacts upon habitat and MIS use of habitat occurs. Under this alternative, cross-country travel would not be prohibited. It is assumed that the proliferation of unauthorized routes and Open Areas would continue and the effects would be similar to those discussed under adding roads and motorized trails to the NFTS. There would be continued use of about 34 miles of unauthorized routes and 15 acres of unauthorized Open Areas in late seral closed canopy habitat within the project area under this alternative.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or areas proposed for addition to the NFTS under this alternative; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effect upon late seral closed canopy coniferous habitat effectiveness.

ALTERNATIVE 2 – PROPOSED ACTION

Effects due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and 6 acres of Open Areas are proposed for addition to the NFTS. Of the 44 miles added, 3 miles are within late seral closed canopy coniferous forest habitat. None of the Open Areas to be added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 17 more miles of roads and motorized trails within the habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 39 percent.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2.

Effects Due to Additions to the NFTS: Under this alternative, there would be no new roads, motorized trails or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads). Effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private and other public roads and motorized trails. The effects are the same as described in Alternative 2. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of roads and motorized trails and 37 acres of Open Areas are proposed for addition to the NFTS. Of the 51 miles of roads and motorized trails added, approximately 3 miles are within late seral closed canopy coniferous forest habitat. Of the 37 acres of Open Areas added, approximately 0.1 acre is within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 24 more miles of roads and motorized trails within the habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 47 percent.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 85 miles of roads and motorized trails and 105 acres of Open Areas are proposed for addition to the NFTS. Of the 85 miles added, approximately 6 miles are within late seral closed canopy coniferous forest habitat. Of the 105 acres of Open Areas added, approximately 1 acre is within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 13 more miles of roads and motorized trails within the habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 33 percent.

Late Seral Closed Canopy Coniferous Forest Habitat - Cumulative Effects

Per direction in the LRMP, as amended by the SNF Bioregional MIS Report, determinations of project-level species impacts are not made for MIS. Instead a relationship of project-level habitat impacts to bioregional-scale habitat and population trends is provided for MIS.

As discussed above, roads, motorized trails and Open Areas that are within ¼ mile of the habitat likely increase: (1) nesting/denning, resting and foraging disturbance; (2) nest predation (for birds); and/or (3) habitat avoidance. Those impacts are most significant during the reproductive seasons and may reduce reproductive success. Reproductive seasons span from around the beginning of March to mid-August. The periods of greatest sensitivity occurs during nest/den building, and (for birds) incubation when the individual is more likely to abandon the site (Gotmark 1992 in Knight and Gutzwiller 1995). Another period of sensitivity is the nestling/fledgling periods (for birds), and the maternal period (for mammals) when parental attentiveness may be disturbed; thereby, disrupting feeding patterns and increasing the chance that young may become stressed and/or predated upon.

The higher the road and motorized trail density, the greater the amount of habitat taken out of effective MIS use. When route density exceeds a certain point, the habitat does not provide any place for undisturbed reproduction, foraging, or resting to occur. If route density remains too high, habitat is likely avoided. Species population can be reduced as a result. Existing motorized travel has created a route density of 2.72 mi./sq.mi within late seral closed canopy coniferous forest habitat and has likely impacted as much as 66 percent of late seral open canopy habitat and as much as 84 percent of late seral closed canopy habitat within the analysis area by decreasing their effectiveness for MIS. A comparison of route densities and percent habitat impacted is provided in the table below (Table 3- 165).

Other activities within the analysis area cumulatively affect the habitat. CDFG (2005 *In: USDA-FS 2008*) lists loss of habitat via timber harvesting as a factor impacting all three MIS species. Within the analysis area, about 53,192 acres have been impacted by timber management activities. Some of the activities likely occurred in late seral closed canopy stands and likely reduced the amount of habitat available by converting the stands into early seral plantations or late seral open canopy stands. About 4,028 acres or 6 percent of late seral closed canopy habitat that currently exists within the analysis area has or will be impacted by timber management activities within the timeframe of this analysis. These sales have/will likely improved the growth, vigor, health, and resistance of the stands.

CDFG lists fuel reduction/prescribed fire activities as one of the factors that impacts late seral closed canopy MIS. Nevertheless, USFWS states that the short-term negative impacts are ameliorated by the longer-term benefit of reducing the greater risk of catastrophic wildfire. About 1,535 acres of prescribed burns have or will occur in late seral closed canopy coniferous forest habitat within the analysis area. Prescribed burns have or will likely benefit the habitat by removing excess fuel buildup and making the habitat less susceptible to wildfires.

About 2,104 acres of wildfires have occurred in late seral closed canopy coniferous forest habitat within the analysis area. Viewing historical fires records of the High Sierra Ranger District, it is foreseeable that about 1,866 additional acres would burn on the district in the foreseeable future. The same acreage is assumed for the Bass Lake RD. While many burned acres are replanted, it takes decades for late-seral habitat to re-establish. Some coniferous forest habitats do not re-establish either because the burned sites are no longer conducive to coniferous forest regeneration or budget constraints do not allow every acre to be replanted. Such acres typically convert to shrubland habitat. Under the current funding trend (last 10 years), only about 10 percent of burned coniferous forest habitats have been replanted (Rojas 2008). Nevertheless, it is anticipated that only around 9 percent of late seral closed canopy habitat within the analysis area has/will be impacted by wildfires.

Table 3- 165 below summarizes the differences that would occur within late seral closed canopy habitat under each alternative.

Table 3- 165. Indicators per Alternative for Late Seral Closed Canopy Coniferous Forest Habitat

	Acres Open to Motorized Cross-country Travel	Miles of NFTS and other Private/Public Roads and Motorized (added miles included in total above)	Miles of NFTS Roads and Motorized Trails Closed Year-Round	Miles of Unauthorized Routes that Can Receive Motorized Travel	Route Density (mi./sq. mi.)	Acres of Managed Open Areas (added Open Areas included in total above)	Acres of Unauthorized Open Areas that Can Receive Motorized Travel	Acres and Percent Habitat Impacted by a Decrease in Effectiveness for MIS
Alt1	58,731	247 (+0)	27	34	2.70	1 (+0)	15	54,451 = 82%
Alt2	0	250 (+3)	44	0	2.40	1 (+0)	0	32,593 =49%
Alt3	0	247 (+0)	27	0	2.38	1 (+0)	0	37,513 =57%
Alt4	0	250 (+3)	51	0	2.40	1 (+0)	0	30,346 =46%
Alt5	0	253 (+6)	40	0	2.43	2 (+1)	0	36,375 =55%

Relationship of Late Seral Closed Canopy Coniferous Forest Habitat to MIS

California Spotted Owl

The California spotted owl was selected as an MIS for late seral closed canopy coniferous forest in the Sierra Nevada. The owl is strongly associated with forests that have a complex multi-layered structure, large-diameter trees, and high canopy closure (CDFG 2005, USFWS 2006). It uses dense, multi-layered canopy cover for roost seclusion; roost selection appears to be related closely to thermoregulatory needs, and the species appears to be intolerant of high temperatures (CDFG 2005). Mature, multi-layered forest stands are required for breeding (Ibid). The mixed-conifer forest type is the predominant type used by spotted owls in the Sierra Nevada: about 80 percent of known sites are found in mixed-conifer forest, with 10 percent in red fir forest (USDA-FS 2001). Refer to the California spotted owl section provided in Chapter 3 for species status information on the SNF.

American Marten

The American marten was selected as an MIS for late seral closed canopy coniferous forest in the Sierra Nevada. Martens prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy closure, and an interspersion of riparian areas and meadows. Important habitat attributes are: vegetative diversity, with predominately mature forest; snags; dispersal cover; and large woody debris (Allen 1987). Key components for westside and eastside marten habitat can be found in the Sierra Nevada Forest Plan Amendment FEIS (USDA-FS 2001), Volume 3, Chapter 3, part 4.4, pages 20-21. Refer to the American Marten section provided in Chapter 3 for species status information on the SNF.

Northern Flying Squirrel

The northern flying squirrel was selected as an MIS for late seral closed canopy coniferous forest habitat in the Sierra Nevada. The northern flying squirrel occurs primarily in mature, dense conifer habitats intermixed with various riparian habitats, using cavities in mature trees, snags, or logs for cover (CDFG 2005).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trends

As determined in the MIS Report for Travel Management (Strand and Sanchez 2010), current motorized travel on the SNF is affecting up to 55,936 acres or 6 percent of late seral closed canopy coniferous forest habitat within the Sierra Nevada bioregion. Affected acres were derived by summarizing the acres of habitat impacted by existing and added roads, motorized trails and Open Areas. As reasoned in the MIS Report, acres of habitat that are only occasionally traversed by cross-country travel (i.e. no unauthorized routes exist) were not included in the calculation of affected acres. Acres of habitat impacted by roads and motorized trails were derived by placing a ¼ mile buffer along all routes that are open either year-round or seasonally. Roads and motorized trails that are closed year-round were not included in the calculation of affected acres, as reasoned in the MIS Report. A ¼ mile buffer is conservative and likely overestimates the percent of habitat affected. Therefore, it is likely that less than 6 percent of the habitat within the Sierra Nevada bioregion has likely been affected by motorized travel on the SNF. An assumption was made in the MIS Report that affects upon MIS habitats that are 5 percent or greater are significant and may affect habitat and population trends. As such, motorized travel on the SNF may have adversely affected late seral closed canopy coniferous forest habitat and the distribution of the California spotted owl, American marten, and northern flying squirrel at the bioregional level.

The Travel Management Project will directly, indirectly, and cumulatively affect up to 30,346 acres of late seral closed canopy coniferous forest habitat (lowest) under Alternative 4, and 54,451 acres (highest) under the No Action Alternative. The Motorized Travel Management Plan would **not** result in a change of: (1) habitat acres; (2) canopy cover class; or (3) CWHR size class. However, effectiveness of the habitat would be impacted due to: (1) human disturbance, (2) edge effects, and (3) habitat avoidance and abandonment. Nevertheless, acres impacted range from 3 to 5 percent of the total Sierra Nevada-wide acreage. The action alternatives would decrease impact of motorized travel to 3 and 4 percent. The No Action Alternative would continue to impact up to (but as reasoned above, likely less than) 5 percent of the habitat. Therefore, all of the alternatives would likely decrease impact of motorized travel on the SNF to the point that it would not affect the habitat nor the distribution of the California spotted owl, American marten, and northern flying squirrel at the bioregional level.

Table 3- 166. Summary of Acres of Past, Present and Reasonably Foreseeable Future Projects and Acres Affected for Late-successional Species

Disturbance	Total acres across the Analysis Area Per Disturbance	Reasonably Foreseeable Future (acres of activities)	Acres Affected Per Disturbance	Direct and Indirect Effects	Current Change in Amount of Habitat
Prescribed fire	19,191	2000	1535	Habitat quality reduction through removal of understory veg., some snags and downed logs	8 percent change
Wildfire	40,003	3600	2104	Habitat loss	5 percent change
Vegetation Management (Timber Sales included) *	526,689	Unknown	5498	Habitat reduction	1 percent change
Hazard Trees	6089	Unknown	6089	Short-term noise disturbance	Unknown
Plantations	47,465	Unknown	3164	Long-term benefit future habitat for species	7 percent
Private land	95,725	Unknown	Unknown	Unknown	Unknown
Special Uses	1812	Unknown	Unknown	Unknown	Unknown
Livestock grazing	743,247	Unknown	Unknown	Potential habitat modification	Unknown
Recreation facilities	3242	Unknown	Unknown	Unknown	Unknown

*uneven age treatment, clear cutting, thinning, hand release, chemical release and planting in plantations <30 yrs. old.

Ungulates

Ungulates on the SNF are represented by the mule deer. Because the mule deer was selected as the MIS for oak-associated hardwood and hardwood/conifer habitat, this habitat is discussed under the ungulate section following the analysis of the deer. Oak-associated hardwood and hardwood/conifer habitat in the Sierra Nevada bioregion is comprised of montane hardwood (MHW) and montane hardwood-conifer (MHC) as defined by the CWHR (CDFG 2005). This habitat is addressed as montane hardwood habitat in the MTM MIS Report (Strand and Sanchez 2010) and will be address as such in this chapter.

Mule Deer – Affected Environment

The LRMP indicates that mule deer use a mix of all successional stages, but the most important mule deer habitat types are early successional types, hardwoods and shrublands. Most deer on the SNF migrate seasonally between higher elevation summer range and low elevation winter range. In general, critical winter range, critical summer range and fawning habitats represent key habitats for deer where heavier use and higher quality habitats for wintering and summer use are expected to occur.

Some of the winter ranges, population centers and holding areas are interconnected and when they are shown on the LRMP maps they are shown as one large polygon; therefore, in the following tables they are recognized as one but are given two numbers because there are different standards and guidelines for particular areas. The population centers, holding areas and winter ranges encompass other habitat besides oak associated hardwood and hardwood/conifer habitat.

Mule deer are the most important big game species on the SNF. Yosemite, Huntington, Oakhurst, San Joaquin and North Kings are the principal deer herds. Although a few animals occupy winter ranges throughout the year, each herd is predominately migratory. The SNF provides the majority of summer and winter range for the San Joaquin, Huntington and North Kings herds. The forest also provides most of the summer range for the Oakhurst herd and a portion of winter range for the Yosemite herd.

There are 30 deer population centers (approximately 133,243 acres), 15 (17 if separate polygons) holding areas (approximately 48,363 acres) and 6 (7 if separate polygons) winter ranges (approximately 185,290 acres) that are identified on the wildlife element map in the LRMP. There are a number of migration routes that equate to approximately 133,257 acres. Of those areas, there are 13 deer population centers that are identified by the LRMP with standard and guideline #44 (minimize, during July, management activities). There are 13 holding areas that are identified in the LRMP with standard and guideline #45 (minimize management activities in particular deer holding areas on particular dates depending on elevation) and 4 deer winter ranges that are identified in the LRMP with standard and guideline #46 (keep vehicle travel at low levels in particular deer winter ranges).

Mule Deer – Environmental Consequences

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the mule deer. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to migration corridors
- Acres of roads and motorized trails added to the NFTS within ZOI of migration corridors

- Miles of roads and motorized trails within winter range
- Acres of roads and motorized trails added to the NFTS within ZOI of winter range
- Density (miles of roads and motorized trails /sq mile of deer area) within winter range
- Miles of roads and motorized trails within population centers
- Acres of roads and motorized trails added to the NFTS within ZOI of population centers
- Density (miles of roads and motorized trails /sq mile of deer area) within population centers
- Miles of roads and motorized trails within holding areas
- Acres of roads and motorized trails added to the NFTS within ZOI of holding areas
- Density (miles of roads and motorized trails /sq mile of deer area) within holding areas

Direct and Indirect Effects

To assess the potential direct and indirect impacts to deer from road and motorized trail-associated disturbance, the miles of roads and motorized trails to be added to National Forest System were determined for each alternative by key deer types (population centers, holding areas and winter ranges) and by habitat type.

For all major deer herds occurring within the boundaries of the SNF, Alternative 1, with continued use of unauthorized routes under continued cross-country travel, would have the greatest road and motorized trail density compared to all the action alternatives within essential population centers, holding areas and winter ranges, especially on the west side of the Forest. Alternative 5 would have slightly greater road and motorized trail densities than all the remaining action alternatives. Within population centers and winter ranges, Alternative 1 poses a somewhat higher risk to all deer herds on the SNF and may therefore pose a greater risk in the ability for these deer herds to successfully reproduce and rear fawns, as compared to all the action alternatives. The action alternatives are not significantly different in their road and motorized trail densities and, therefore, impacts to the Sierra deer herds within population centers and winter ranges do not vary greatly amongst the action alternatives. Alternative 1 road and motorized trail densities exceed the action alternatives by over 1 mile/square mile in some instances, where habitat effectiveness would be reduced.

Displacement or Avoidance: In general, mule deer will move away from or flush, from an approaching person and will usually allow a person in or on a vehicle to get closer than a person on foot (Freddy et al. 1986, Wisdom et al. 2004). Wisdom et al. (2004) found that mule deer showed little measurable flight response to experimental motor vehicle treatments but cautioned that deer may well be responding with fine-scale changes in habitat use (i.e. avoidance), rather than substantial increases in movement rates and flight responses. Several studies have found that mule deer avoid areas in proximity to roads. Deer avoid primary roads more than secondary or tertiary roads and also avoid roads more in open habitats as opposed to areas with vegetative or topographic cover (deVos et al. 2003).

Various studies have shown that mule deer have displacement distances that vary between 200 and 800 meters (656 feet and 2625 feet), depending upon the road type and traffic level and the surrounding habitat (Perry and Overly 1977, Rost and Bailey 1979). One study showed that if

habitat was available away from a linear road or trail, then deer avoided the disturbance corridor (Jalkotzy et al. 1997). However, when no suitable deer habitat was available away from the road or trail, then deer used the habitat adjacent to the road or trail. Rost and Bailey (1979) reported that deer and elk in Colorado avoided coming within 200 meters (656 feet) of a road. Perry and Overly (1977) reported that deer were displaced up to 800 meters (2625 feet) from roads.

Main roads were found to reduce deer use up to 0.5 mile (800 m) from the road, whereas secondary and primitive roads reduced deer densities from between 200 to 400 meters (0.12 to 0.25 miles) in these studies. Additional variables such as the amount and frequency of traffic and the spatial distribution of roads in relation to deer use, influence the degree of negative effects that roads have on deer use in forested habitats (Perry and Overly 1977, deVos et al. 2003). Where disturbance causes deer to avoid areas within preferred habitats, animals may be forced into less preferred or lower quality habitats. Such shifts, particularly if repeated, can result in adverse impacts to the energy balance of individual deer and ultimately can decrease population productivity, especially on winter ranges (deVos et al. 2003).

Collisions: Vehicle collisions with deer can contribute considerably to direct deer mortality. Deer are probably the most frequently-killed large mammal along North America's roads. The Insurance Institute for Highway Safety commissioned a study which estimated that more than 1.5 million deer/vehicle collisions occur annually, resulting in more than 29,000 human injuries and 150 deaths. Romin and Bissonette (1996) conservatively estimated that the U.S. National deer road kill in 1991 totaled at least 500,000 deer. Deer road kills vary considerably by region and by season. In California, mule deer road kill along a 3-mile stretch of secondary highway was estimated at 3.7 and 4.8 per kilometer per year during spring and fall migrations, respectively (Jalkotzy et al. 1997).

Deer and vehicle collisions probably differ by the type of road or trail, so care must be given when considering deer-vehicle collisions. The majority of deer-vehicle collisions occur in the early morning or late afternoon and evening hours, around dawn and sunset, when the deer are most active and when visibility is poor. More deer-vehicle collisions occur during the spring and fall when deer are migrating and in the rut. In the fall, hunting may cause deer to be more wary and increase movement of deer. In the spring, vegetation tends to green-up along roadsides and attract deer to roads. There are little to no data on deer road kills along Forest roads, however roads maintained at a higher standard for passenger vehicle (maintenance levels 3, 4, and 5), where vehicle speeds are greatest, have the most potential to contribute to deer-vehicle collisions. Deer-vehicle collisions on roads and trails which are maintained for high clearance vehicles (maintenance level 2 roads) are probably not appreciable in number due to the lower speeds and the amount of use received by these roads.

In migration, the evidence indicates that wildlife avoids traffic on roads, but not that roads interrupt migrations (Bowles in Knight and Gutzwiller 1995, pg 135). Acute noise exposure does not affect the course of migration significantly, although it can cause short detours or an increase in the rate of travel (Ibid).

Edge and Marcum (1985) reported that elk leave a 0.3 to 0.6 mile (500-1000 m) buffer zone around logging roads when traffic is high (at a rate of a few transits per day), but not at other times. Similar observations have been made for deer (Dorrance et al 1975; Singer and Beattie 1986). The range at which animals avoided traffic was approximately the range at which they could detect traffic noise, suggesting that traffic noise was meaningful through association with human activity.

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative; therefore, it is assumed the route proliferation would continue over the short and long term.

Impacts of unauthorized routes are most significant in: (1) deer population centers during the reproductive season (July); (2) deer winter range from December through April; and/or (3) deer holding areas during migration seasons (May 15-June 15, Oct 1-Nov 30 above 5,000 feet; and May 1-June 1, Oct 15-Nov 30 below 5,000 feet).

Disturbance in population centers during July likely reduces reproductive success. Adequate foraging is critical for milk production. The greater the disturbances related to vehicular travel, the more time spent in alert or in flight and the less time foraging. Road traffic itself may not elicit much response, but when vehicles stop and people get out, disturbance level increases.

Disturbance in deer winter range likely affects an individual’s survival. While the flight response of deer tends to be less in winter, when elicited, the impact is higher because it is critical to consume and conserve energy in winter.

Disturbance in holding areas during migration can indirectly impact an individual’s reproductive success in summer and survivability in winter. During spring migration, it is important to conserve energy reserves because poor reserves affect fetal development and fawn survival (CDFG 1984). During fall migration, it is important to consume enough browse and/or acorns to pre-fatten for winter (Ibid); therefore, the less energy expended in flight and the more time grazing, the better.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or Open Areas proposed for addition to the NFTS under this alternative; therefore, there would be no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on deer within the zone of influence for each area and associated habitat.

Table 3- 167. Alternative 1 – Deer Winter Range

Indicators	Measure
Miles of unauthorized roads and motorized trails within deer winter range	90 miles
Unauthorized road and motorized trail density	.31 mi/sq mi

Table 3- 168. Alternative 1 – Deer Population Centers

Indicators	Measure
Miles of unauthorized roads and motorized trails within deer population centers	20 miles
Unauthorized road and motorized trail density	.09 mi/sq mi

Table 3- 169. Alternative 1 – Deer Holding Area

Indicators	Measure
Miles of unauthorized roads and motorized trails within deer holding areas	16 miles
Unauthorized road and motorized trail density	.21 mi/sq mi

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Therefore, it is assumed this would limit the proliferation of unauthorized routes within all types of mule deer habitat. This would reduce the risk of direct and indirect effects, which is a beneficial effect, to mule deer from motorized travel over the short and long term. Unauthorized routes that aren't added to the NFTS would eventually become ecologically adjusted and associated vegetative cover within the affected habitat would be increased. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Actions proposed in this alternative would likely decrease disturbance to some mule deer within the project area, compared to Alternative 1. Decreases in road and motorized trail densities and percentages of habitat influenced by motor vehicles on summer and winter range would likely result in decreased disturbance to some mule deer within the project area. The overall route density for deer winter range in this alternative is 0.12 miles/sq mile (Table 3- 174). There are two out of 30 population centers (7 percent) that are affected with added roads and motorized trails (Table 3- 172). The road and motorized trail density within the 30 population centers is .09 miles/sq mile (Table 3- 175). There are two deer holding area out of 15, which is 13 percent of all holding areas, affected by intersecting routes (Table 3- 173). The overall road and motorized trail density for deer holding areas are 1.87 miles/sq miles.

Under this alternative, 44 miles of roads and motorized trails and 1 Open Area (6 acres) are proposed for addition to the NFTS. The Open Area is not within any of the deer habitat areas.

Table 3- 170. Alternative 2 – Deer Migration Corridors

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer migration corridors	7.8 miles
Acres of roads and motorized trails added to the NFTS within ZOI of migration corridors	819 acres

Table 3- 171. Alternative 2 – Deer Winter Range

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer winter range	3 miles
Acres of roads and motorized trails added to the NFTS within ZOI of winter range	1186 acres
Number of winter range areas that intersect with roads and motorized trails	2

Table 3- 172. Alternative 2 – Deer Population Centers

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer population centers	1 miles
Acres of roads and motorized trails added to the NFTS within ZOI of population centers	415 acres
Number of population centers that intersect with roads and motorized trails	2

Table 3- 173. Alternative 2 – Deer Holding Areas

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer holding areas	3 miles
Acres of roads and motorized trails added to the NFTS within ZOI of holding areas	1186 acres
Number of holding areas that intersect with roads and motorized trails	2

Table 3- 174. Alternative 2 – Route Density within Winter Range

Indicators	Density (miles of roads and motorized trails/sq mile) of deer area
Winter range	
2 South Fork Merced River	0.04
3 Miami Mountain	0.08
Total	0.12

Table 3- 175. Alternative 2 – Route Density within Population Centers

Indicators	Density (miles of roads and motorized trails/sq mile) of deer area
Population Center	
2-3 Grizzly Beasore	0.04
12 Markwood	0.05
Total	0.09

Table 3- 176. Alternative 2 – Route Density within Deer Holding Areas

Indicators	Density (miles of roads and motorized trails/sq mile) of deer area
Holding areas	
8 Glen Meadow	1.34
11 Big Fir-Dinkey-Lower Dinkey	0.03
Total	1.37

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Alternative 2 would decrease impacts occurring from current management of the NFTS. It would increase miles of NFTS roads and motorized trails that are closed year-round from 236 to 446 miles, and would increase miles that are seasonally closed from 470 to 986 miles.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Motorized cross-country travel and use of all the unauthorized routes and Open Areas created by past cross-country travel would be prohibited on the SNF.

It would prevent disturbance to the species within this group by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The potential impacts discussed under Alternative 1 from cross-country travel would not occur.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails or Open Areas are proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to mule deer.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS. Effects would be the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Therefore, it is assumed this would limit the proliferation of unauthorized routes within all types of mule deer habitat. This would reduce the risk of direct and indirect effects, which is a beneficial effect, to mule deer from motorized travel over the short and long term. Unauthorized routes that aren't added to the NFTS would eventually become ecologically adjusted and associated vegetative cover within the affected habitat would be increased. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: There are four winter ranges out of six affected by additional roads and motorized trails (Table 3- 191). (The overall route density in deer winter range is .0741 mi/sq mi (Table 3- 181)). There are 3 population centers out of 30 that are intersected with additional roads and motorized trails. There are 3 out of 30 population centers that have approximately 0.09 miles of routes being added to the NFTS (Table 3- 182). There are 2 holding area out of 15 (13 percent) affected by the addition to the NFTS, under this alternative. The route density is 0.87 mi/sq mi respectively out of 15 deer holding areas (Table 3- 183). In this alternative, 11 Open Areas, totaling 37 acres are proposed for addition to the NFTS. Of the 11, 3 Open Areas are in deer winter range totaling 3.78 acres (approximately 10 percent of the Open Areas and 0.002 percent of the total winter range). Also design feature WL-5 addresses the season of use by applying the closure to roads and motorized trails so there would be less disturbance to deer. Roads accessing the areas would not open until May 1 or June 1; therefore, there should be less direct and indirect effects to deer. There are no Open Areas proposed in the population centers or holding areas under this alternative.

Table 3- 177. Alternative 4 – Deer Migration Corridors

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer migration corridors	3.9 miles
Acres of roads and motorized trails added to the NFTS within ZOI of migration corridors	1439 acres

Table 3- 178. Alternative 4 – Deer Winter Range

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer winter range	3 miles
Acres of roads and motorized trails added to the NFTS within ZOI of winter range	1053 acres
Number of winter range areas that intersect with roads and motorized trails	4

Table 3- 179. Alternative 4 – Deer Population Centers

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer population centers	1.5 miles
Acres of roads and motorized trails added to the NFTS within ZOI of population centers	1285 acres
Number of population centers that intersect with roads and motorized trails	3

Table 3- 180. Alternative 4 – Deer Holding Areas

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer holding areas	2 miles
Acres of roads and motorized trails added to the NFTS within ZOI of holding areas	1186 acres
Number of holding areas that intersect with roads and motorized trails	2

Table 3- 181. Alternative 4 – Route Density (miles of roads and motorized trails per sq. mile of deer area) within Winter Range Areas

Indicators	Density
Winter range	
2 South Fork Merced River	0.03
3 Miami Mountain	0.02
5 Kinsman Flat	0.02
6-7 Secata-Cottonwood/Rodgers Ridge	0.0041
Total	0.0741

Table 3- 182. Alternative 4 – Route Density (miles of roads and motorized trails per sq. mile of deer area) within Population Centers

Indicators	Density
Population Center	
2-3 Grizzly/Beasore	0.04
7 Little Shuteye	0.03
12 Markwood	0.02
Total	0.09

Table 3- 183. Alternative 4 – Route Density (miles of roads and motorized trails per sq. mile of deer area) within Holding Areas

Indicators	Density
Holding areas	
8 Glen Meadow	0.78
9-10 Summit/Blue Canyon-Providence	0.09
Total	0.87

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads) Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1).

There are 1568 miles that are seasonally closed in this Alternative which is 1098 miles more than what is currently seasonally closed. There are 552 miles closed year-round which is a little more than twice as much as currently closed (236 miles).

Wet weather seasonal restrictions of native surface motorized roads and trails are analyzed for the project alternatives. Alternatives 4 and 5 provide additional wet weather seasonal restrictions, which may benefit deer that may be using areas that are not currently under existing LRMP deer seasonal restrictions. In areas outside current LRMP closure areas, the wet weather seasonal closures would provide an additional four months wet weather closure and would reduce the effects of motor vehicles upon deer using these areas.

Also Resource Issue Code WL-5 addresses the season of use by applying the closure to roads and motorized trails so there would be fewer disturbances to deer; therefore, there should be less direct and indirect effects to deer.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Therefore, it is assumed this would limit the proliferation of unauthorized routes within all types of mule deer habitat. This would reduce the risk of direct and indirect effects, which is a beneficial effect, to mule deer from motorized travel over the short and long term. Unauthorized roads and motorized trails that aren't added to the NFTS would eventually become ecologically adjusted and associated vegetative cover within the affected habitat would be increased. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Alternative 5 proposes the highest amount of roads and motorized trails (85 miles) and 20 Open Areas for addition to the NFTS (see Table 3- 139, pg. 3-341 in the beginning of this chapter). Approximately 15 miles would become NFTS roads and 70 miles would become NFTS motorized trails. Overall, there is approximately 0.2 mi/sq mi within the deer winter range across the SNF (Table 3- 188).

There are 3 out of 30 population centers that have approximately 0.24 mi/sq mi of roads and motorized trails being added to the NFTS (Table 3- 189). There is approximately 1.25 mi/sq mi of roads and motorized trails within 2 out of 15 holding areas (Table 3- 185). In this alternative, there are 20 proposed Open Areas, totaling 105 acres. Of the 20 areas, 5 Open Areas are in deer winter range totaling 5.34 acres (approximately 4.7 percent of the Open Areas and 0.002 percent of the total winter range). Also design feature WL-5 addresses the season of use by applying the closure to roads and motorized trails so there would be less disturbance to deer, the roads accessing the areas would not open until May 1 or June 1; therefore, there should be less direct and indirect effects to deer. There are two Open Areas, totaling 68.9 acres (approximately 61 percent of the Open Areas and 0.05 percent of the total population center being affected), proposed in one population center (Table 3- 191). There are no Open Areas proposed in the holding areas under this alternative.

Table 3- 184. Alternative 5 – Deer Migration Corridors

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer migration corridors	13 miles
Acres of roads and motorized trails added to the NFTS within ZOI of migration corridors	4120 acres

Table 3- 185. Alternative 5 – Deer Winter Range

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer winter range	7.9 miles
Acres of roads and motorized trails added to the NFTS within ZOI of winter range	2818 acres
Number of winter range areas that intersect with roads and motorized trails	5

Table 3- 186. Alternative 5 – Deer Population Centers

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer population centers	3.5 miles
Acres of roads and motorized trails added to the NFTS within ZOI of population centers	2085 acres
Number of population centers that intersect with roads and motorized trails	3

Table 3- 187. Alternative 5 – Deer Holding Areas

Indicators	Measure
Miles of roads and motorized trails added to the NFTS within deer holding areas	3 miles
Acres of roads and motorized trails added to the NFTS within ZOI of holding areas	1186 acres
Number of holding areas that intersect with roads and motorized trails	2

Table 3- 188. Alternative 5 – Route Density (miles of roads and motorized trails per sq. mile of deer area) within Winter Range Areas

Indicators	Measure
Winter Range	
2 South Fork Merced River	0.05
3 Miami Mountain	0.08
4 Taylor Mountain	0.02
5 Kinsman Flat	0.03
6-7 Secata-Cottonwood/Rodgers Ridge	0.02
Total	0.2

Table 3- 189. Alternative 5 – Route Density (miles of roads and motorized trails per sq. mile of deer area) within Population Centers

Indicators	Measure
Population Center	
2-3 Grizzly_Beasore	0.05
7 Little Shuteye	0.10
12 Markwood	0.09
Total	0.24

Table 3- 190. Alternative 5 – Route Density (miles of roads and motorized trails per sq. mile of deer area) within Holding Areas

Indicators	Measure
Holding areas	
8 Glen Meadow	1.20
9-10 Summit_Blue Canyon-Providence	0.05
Total	1.25

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads) Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1).

Wet weather seasonal restrictions would be the same as discussed under Alternative 4. There would be a slightly higher adverse effect than Alternative 4 because fewer roads and motorized trails would be closed. The wet weather restrictions encompass the design features for season of use so there are fewer disturbances to some of the deer areas as recognized in the LRMP.

Alternative 5 would also decrease impacts to habitats within the analysis area from currently existing NFTS roads and motorized trails. There is an increase of miles on NFTS roads and motorized trails that are seasonally closed from 470 to 1625 miles. Under Alternative 5, 63 percent of the roads that are seasonally closed compared to 17 percent seasonally closed under Alternative 1. There are more roads and motorized trails with a season of use applied versus open year-round. This alternative would increase miles of NFTS roads and motorized trails that are closed year-round from 236 to 418 miles.

Summary of Deer Areas

Four (4) deer holding areas out of 15 (26 percent of all holding areas) are affected by the action alternatives. Five (Kinsman Flat, Rodgers Ridge, Secata Cottonwood, South Fork Merced River and #3), out of six (83 percent) deer winter range areas are affected and intersect with roads and motorized trails proposed for addition to the NFTS. There are 3 out of 30 (10 percent) population centers on the SNF that are affected and intersect with roads and motorized trails proposed for addition to the NFTS.

Table 3- 191. Deer Areas that are Intersecting with Existing (Alt 1), Added Roads, Motorized Trails (Alts 2, 4 and 5) or Open Areas

Route	District	Alternative	Analysis Unit	Holding Area	Winter Range	Population Center
AE-14z	BLRD	1,4,5	Mammoth		Kinsman Flat 5	
AE-18z	BLRD BLRD	1,4,5	Gaggs		Kinsman Flat 5	
BP133	BLRD	1, 5	Mammoth		Kinsman Flat 5	
BP21	BLRD	1,5	Gaggs			Little Shuteye 7
BP24	BLRD	1, 5	Gaggs			Little Shuteye 7
BP37	BLRD	1,4,5	Gaggs			Little Shuteye 7
BP48	BLRD	1,4,5	Gaggs			Little Shuteye 7
ES10	HSRD	1,5	Jose Chawanakee		Kinsman Flat 5	
JG10	BLRD	1,5	Gaggs		Rodgers Ridge 7	
JH-11	HSRD	1, 2, 5	Tamarack-Dinkey	Glen Meadow 8		
JH-12	HSRD	1, 2, 4, 5	Tamarack-Dinkey	Glen Meadow 8		
JH-125	HSRD	1,2	Tamarack-Dinkey	Big Fir-Dinkey-Lower Dinkey 11		
JH-126	HSRD	1,2	Tamarack-Dinkey	Big Fir-Dinkey-Lower Dinkey 11		
JH-15	HSRD	1,2,4,5	Tamarack-Dinkey	Glen Meadow 8		
JH-18	HSRD	1,2,4,5	Tamarack-Dinkey	Glen Meadow 8		
JH-18b	HSRD	1,2,4,5	Tamarack-Dinkey	Glen Meadow 8		
JH-40	HSRD	1,2,5	Tamarack-Dinkey	Glen Meadow 8		
JM-16z	BLRD	1,5	Gaggs			Little Shuteye 7
JM-18	BLRD	1,4,5	Gaggs			Little Shuteye 7
JM-21z	BLRD	1,5	Tamarack-Dinkey			Markwood 12
JM-36	BLRD	1,2,5	Westfall		Miami Mtn 3	
JM-41	BLRD	1,5	Westfall		Miami Mtn 3	
JM-44	BLRD	1,5	Westfall		Miami Mtn 3	
KD-20	HSRD	1,2,4,5	Tamarack-Dinkey	Glen Meadow 8		
KD-21	HSRD	1,	Tamarack-Dinkey	Glen Meadow 8		

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Route	District	Alternative	Analysis Unit	Holding Area	Winter Range	Population Center
KD-94	HSRD	1,4,5	Tamarack-Dinkey	Summit_ Blue Canyon-Providence 9_10		
PK-01z	HSRD	1,2,4,5	Tamarack-Dinkey	Glen Meadow 8		
PK-01zh	HSRD	1,2,5	Tamarack-Dinkey			Markwood 12
PK-01zk	HSRD	1,2,4,5	Tamarack-Dinkey			Markwood 12
PK-04	HSRD	1,2,4,5	Tamarack-Dinkey	Glen Meadow 8		
PK-37	HSRD	1,2,4,5	Tamarack-Dinkey			Markwood 12
PK-48	HSRD	1,2,5	Tamarack-Dinkey	Glen Meadow 8		
PK-51x	BLRD	1,2,4,5	Globe			Grizzly_Be asore 2_3
PK-51xa	BLRD	1,5	Globe			Grizzly_Be asore 2_3
PK-54	HSRD	1,2	Tamarack-Dinkey	Glen Meadow 8		
PK-5	BLRD	1,2,4,	Westfall		Miami Mtn 3	
PK47	BLRD	1.5	Westfall		Taylor Mtn 4	
PUB-07	BLRD	1,4,5	Gaggs		Kinsman Flat 5	
SR-13z	BLRD	1,2,5	Westfall		Miami Mtn 3	
SV-6	BLRD	1,2,4,5	Westfall		Miami Mtn 3	
TH-10z	HSRD	1,5	Dinkey-Kings		Secata-Cottonwood/Rodgers Ridge 6_7	
TH-161z	BLRD	1,5	Globe			Little Shuteye 7
TH-28z	BLRD	1,4,5	South Fork		South Fork Merced River 2	
TH-29z	BLRD	1,5	South Fork		South Fork Merced River 2	
TH-41y	BLRD	1,2,4,5	Westfall		South Fork Merced River 2	
TH-60z	BLRD	1,4,5	Westfall		South Fork Merced River 2	
TH-67y	BLRD	1,2,4,5	Westfall		South Fork Merced River 2	
TH-67z	BLRD	1,2,5	Westfall		South Fork Merced River 2	
TH-68z	BLRD	1,2,5	Westfall		South Fork Merced River 2	
TH-69y	BLRD	1,4,5	Westfall		South Fork Merced River 2	
TH-74	BLRD	1,5	Westfall		South Fork Merced River 2	

Route	District	Alternative	Analysis Unit	Holding Area	Winter Range	Population Center
ZZ20	HSRD	1,4,5	Dinkey-Kings		Secata-Cottonwood/Rodgers Ridge 6_7	
TH-87	BLRD	1,5	Westfall		South Fork Merced River 2	
ZZ21	HSRD	1,4,5	Dinkey-Kings		Secata-Cottonwood/Rodgers Ridge 6_7	
ZZ25	HSRD	1,4,5	Dinkey		Secata-Cottonwood/Rodgers Ridge 6_7	
ZZ26	HSRD	1,4,5	Dinkey		Secata-Cottonwood/Rodgers Ridge 6_7	
Open Areas	District	Alternative	Analysis Unit	Holding Area	Winter Range	Population Center
BLKRC 77	HSRD	4,5	Dinkey-Kings		Secata-Cottonwood/Rodgers Ridge 6_7	
MCLD FLT37 5	BLRD	4,5	Westfall		Taylor Mtn 4	
CHPO SDDL3 90	BLRD	4,5	Westfall		Taylor Mtn 4	
BLKR7 CK8	HSRD	5	Dinkey-Kings		Secata-Cottonwood/Rodgers Ridge 6_7	
SGRLF HL223	HSRD	5	Jose Chawanakee		Kinsman Flat 5	
CNTRL CMPS PR345	BLRD	5	Gaggs			Little Shuteye 7
RCKC RKSP R391	BLRD	5	Gaggs			Little Shuteye 7

Cumulative Effects

Table 3- 192. Road Density (mi/sq mi) (NFTS Plus Roads and Motorized Trails Proposed for Addition) for Each of the Three Deer Areas per Alternative

Road Density per deer area (mi/sq mi.)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Winter range	1.78	1.59	1.47	1.49	1.67
Population centers	1.43	1.43	1.34	1.44	1.57
Holding areas	2.96	4.12	2.75	3.63	3.99

Past, present and reasonably foreseeable actions leading to effects on mule deer include current and historic grazing of mule deer habitat; loss of habitat through catastrophic wildfires; timber and fuels management where cover and forage has been reduced or removed; and recreational activities including hunting, camping and general recreation activities including all forms of motorized use including four-wheel drive vehicles, ATVs and motorcycles.

When considering all the cumulative effects of past, present and reasonably foreseeable future impacts from the activities listed above, Alternative 1 poses the greatest risk to the 4 major deer herds on the SNF, where key winter ranges are influenced by unauthorized roads and motorized trails and key summer ranges would be affected, depending on the deer herd. Alternative 5 slightly increases the amount of cumulative effects on key deer habitats over the other action alternatives, where site specific localized effects may occur. The remaining action alternatives are similar and only slightly increase overall cumulative impacts to the four major deer herds on the SNF. Alternative 3 does not add any roads and motorized trails, so does not add to existing cumulative impacts. All the action alternatives will result in a beneficial impact to all deer ranges across the SNF from the closure of cross-country travel. Degree of benefit depends on the alternative (Alternative 5 most miles added to the NFTS, Alternative 3 least miles added to the NFTS). It is expected that non-motorized use may occur on the unauthorized roads and motorized trails that are not added to the NFTS which would likely result in disturbance to mule deer. Some studies indicate that certain non-motorized activities (hiking, mountain bicycling, equestrian, etc.) could actually result in greater disturbance to mule deer. The amount of disturbance caused by non-motorized use will depend on the type, intensity, timing and duration of the use. As unauthorized motorized routes which are not added to the NFTS become revegetated and recover over time, either through active or passive restoration efforts, overall mule deer disturbance from human activity is expected to diminish in the future.

In addition, Alternatives 3, 4, 5 would benefit deer on winter ranges through the implementation of wet weather closures on native surfaced roads and trails as well as seasonal closures associated with Resource Issue Codes, WL-4 and WL-5.

The same activities listed in Table 3- 193 apply to the alternatives; however, Alternative 4 when overlaid with the other activities would have less of an impact to the deer because there would be more seasonal closures and an increase on the number of roads prohibited. It is a benefit to wildlife because overall there would be fewer disturbances to the species and the habitat.

The effects of cattle grazing can result in a loss of hiding cover for deer which is an important habitat component that is used when fawning occurs (Loft et al. 1987). Because cover is a basic need of wildlife it is concluded that loss of cover does not maximize deer fitness. Historically, the competitive effects of livestock on deer were likely overshadowed by the tremendous level of habitat disturbance that took place between 1849 and the early 1900s. There was likely enough early successional habitat available on forested ranges that livestock and deer did not significantly compete. Since that time, the acreage and quality of deer habitat has declined to the extent cattle and deer may now be competing for resources on summer ranges in mutually preferred meadow-riparian and aspen habitats (Loft and Menke 1988). Also as stated in CDFG 1998, mountain meadows and riparian zones are highly preferred by deer and other wildlife. These and associated aspen habitats are often regarded as key fawning areas and population centers, critical for female deer to nurture young fawns at this most nutritionally demanding time of the year. Overuse of herbaceous and shrub vegetation through the summer reduces hiding and escape cover, and leaves little in terms of quality forage in September-October as deer attempt to build reserves for the winter period.

Thinning treatments may result in the short-term reduction in cover for deer, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Many recent, current

and future vegetation and fuels reduction projects are emphasizing habitat improvement for deer by removing competing conifers within oak habitats and aspen habitats which are designed to enhance mule deer foraging condition.

Currently, there is a high demand for recreational use on the SNF due to its close proximity to urban centers. The SNF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (downhill skiing, cross-country skiing, snowmobiling), summer motor vehicle use, winter OSV use and a variety of other non-motorized use (equestrian use and mountain biking). Recreational use on the SNF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, recreational use on the SNF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting and motor vehicle use. Generally, the increase in recreational use on the SNF has the potential to cause an increase in negative interactions between humans and mule deer. Future increase in recreational use on the SNF is expected and therefore, increased disturbance to mule deer would be expected, particularly during the summer months.

Table 3- 193 summarizes direct, indirect and cumulative impacts from reasonably foreseeable projects and a description of the potential impact to mule deer and their habitat.

Table 3- 193. Direct, Indirect and Cumulative Impact to Mule Deer from Reasonably Foreseeable Future Projects

Project Type	Mule Deer Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction – thinning,	Short-term disturbance from harvest activities, changes in cover, foraging habitat enhancement in oak habitats.	Short-term adverse impacts during harvest. Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Controlled burning and mastication in chaparral habitat	Short-term impact from displacement	Long-term improvement to deer forage condition
Hazard tree removal	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Special Use permit renewal	N/A administrative action	None
Non-motorized Trail development	Short-term disturbance during trail construction, some increased public use may increase disturbance.	Slight increase in cumulative impact.

Oak-Associated Hardwood and Hardwood/Conifer Habitat– Affected Environment

The entire analysis area contains about 204,400 acres of montane hardwood habitat. About 202,836 of them are currently open to cross-country motorized travel. About 112 miles of unauthorized routes (encompassing 49,233 ZOI acres) exist within this habitat. About 0.2 of these miles were created in areas where motorized cross-country travel is currently prohibited. (See Figure 3-1 for a map of those areas). About 576 miles of NFTS roads and motorized trails, private roads, and other public roads (state, county, other federal) (encompassing about 121,814 ZOI acres) exist in montane hardwood habitat within the analysis area. Including the roads, motorized trails, and unauthorized routes, the habitat has a route density of 2.16 mi./sq.mi. About

1.8 acres of managed Open Areas exist within the habitat. Furthermore, about 57.5 acres of unauthorized Open Areas exist within the habitat. About 0.8 acre of these is in prohibited areas. All in all, about 171,107 acres of montane hardwood habitat are impacted by roads, motorized trails and Open Areas. Nevertheless, because about 52 miles of roads and motorized trails (encompassing 17,458 ZOI acres) are closed year-round to vehicular traffic (except for necessary administrative use), the acres of montane hardwood habitat taken out of effective MIS use is closer to 153,649 or 75 percent.

Oak-Associated Hardwood and Hardwood/Conifer Habitat- Environmental Consequences

Direct and Indirect Effects

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the habitat. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Acres of habitat available
- Acres of habitat open for cross-country motorized use
- Miles of unauthorized routes within the habitat, and acres of habitat encompassed by a ¼ mile zone of influence (ZOI)
- Miles of NFTS private, other public roads and motorized trails, within the habitat, and acres of habitat encompassed by a ¼ mile ZOI
- Total density of roads and motorized trails and unauthorized routes that could continue to receive use within the habitat
- Acres of Open Areas (FS managed and unauthorized) within the habitat

ALTERNATIVE 1 – NO ACTION

Effects due to Continued Cross-country Motor Vehicle Travel: Under the No Action alternative, 202,836 acres of montane hardwood habitat would remain open for motorized cross-country travel. Occasional cross-country travel through habitat types on the SNF would not generate lasting impacts upon the habitats, nor would MIS likely avoid using areas that are only occasionally accessed by motor vehicles. However, where cross-country travel occurs in the same vicinity regularly, unauthorized routes and Open Areas are generated and impacts upon habitat and MIS use of habitat occurs. Under this alternative, cross-country travel would not be prohibited. It is assumed that the proliferation of unauthorized routes and Open Areas would continue and the effects would be similar to those discussed under adding roads and motorized trails to the NFTS. There would be continued use of about 112 miles of unauthorized routes and 57 acres of unauthorized Open Areas in montane hardwood habitat within the project area under this alternative.

Effects Due to Additions to the NFTS: Under this alternative, there would be no new roads, motorized trails or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads: Under this alternative, there are no proposed changes to the NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effect upon montane hardwood habitat effectiveness.

ALTERNATIVE 2 – PROPOSED ACTION

Effects due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and 6 acres of Open Areas are proposed for addition to the NFTS. Of the 44 miles added, 12 miles are within montane hardwood habitat. None of the Open Areas to be added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round and seasonal closures. About 37 more miles of roads and motorized trails within the habitat would be closed year-round, and about 6 more miles of roads and motorized trails within the habitat would be seasonally closed during deer use. This would increase the amount of roads and motorized trails closed year-round and seasonally within the habitat by 42 percent.

Note: Unlike other habitats, seasonal closures are as effective in reducing impacts upon MIS use of habitats as year-round closures are. The reason for this is twofold. First, deer tend to utilize specific areas at specific times of the year, and closing roads and motorized trails in areas when they are being used by deer is equally effective as year-round closures. Second, the primary impacts of roads and motorized trails upon deer are related to the human influence (i.e. noise disturbance, hunting, vehicular collisions). Deer are not affected by nest predators/parasites that thrive along road edges.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized roads and motorized trails and Open Areas. Motor vehicle use would be limited to managed Open areas and NFTS, private, and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails or Open Areas are proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS; therefore, the effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized roads and motorized trails and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private and other public roads and

motorized trails. The effects are the same as described in Alternative 2. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of roads and motorized trails and 37 acres of Open Areas are proposed for addition to the NFTS. Of the 51 miles of roads and motorized trails added, approximately 8 miles are within montane hardwood habitat. Of the 37 acres of Open Areas added, approximately 2 acres are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round and seasonal closures. About 61 more miles of roads and motorized trails within the habitat would be closed year-round, and about 14 more miles of roads and motorized trails within the habitat would be seasonally closed during deer use. This would increase the amount of roads and motorized trails closed year-round and seasonally within the habitat by 56 percent.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized roads, motorized trails and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private, and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 85 miles of roads and motorized trails and 105 acres of Open Areas are proposed for addition to the NFTS. Of the 85 miles added, approximately 19 miles are montane hardwood habitat. Of the 105 acres of Open Areas added, approximately 29 acres are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round and seasonal closures. About 39 more miles of roads and motorized trails within the habitat would be closed year-round, and about 15.5 more miles of roads and motorized trails within the habitat would be seasonally closed during deer use. This would increase the amount of roads and motorized trails closed year-round and seasonally within the habitat by 48 percent.

Oak-Associated Hardwoods and Hardwood/Conifer Habitat - Cumulative Effects

As discussed above, motor vehicle use on roads, motorized trails and Open Areas within ¼ mile of the habitat is likely to increase: (1) fawning, resting and foraging disturbance; and/or (2) habitat avoidance. Impacts are most significant in: (1) deer population centers during the reproductive season (July); (2) deer winter range from December through April; and/or (3) deer holding areas during migration seasons (May 15-June 15, Oct 1-Nov 30 above 5,000 feet; and May 1-June 1, Oct 15-Nov 30 below 5,000 feet).

The higher the road and motorized trail density, the greater the amount of habitat taken out of effective MIS use. When density exceeds a certain point, the habitat does not provide any place for undisturbed reproduction, foraging, or resting to occur. If density remains too high, habitat is likely avoided. Species population can be reduced as a result. Existing motorized travel has created a route density of 2.16 mi./sq.mi within montane hardwood habitat and has likely impacted as much as 75 percent of it by decreasing its effectiveness for MIS. A comparison of route densities and percent habitat impacted is provided in the table below (Table 3- 194).

Other activities within the analysis area cumulatively affect the habitat. There are 28 active cattle allotments, encompassing about 743,247 acres, and permitting 17,000 AUMs within the analysis area. Some montane hardwood habitat within the analysis area is utilized for cattle grazing. Cattle impact this habitat by browsing oak saplings and young shrubs, newly emerging oak sprouts, new leader growth of oaks and shrubs, acorns, grass, and forbs. They decrease the availability of food for deer within the habitat. Nevertheless, cattle utilization is limited by standards and guidelines in the 1995 LRMP amendment which limits use of woody shrubs to 20 percent annual leader growth when rangeland is in satisfactory condition and 10 percent if in unsatisfactory condition (USDA-FS 1995b, p. 2-15). The Sierra Nevada Forest Plan Amendment (SNFPA) limits grazing, as well. SNFPA S&G #51 (pp.55-56) mandates that grazing utilization in annual grasslands will maintain a minimum of 60 percent cover, and provides residual dry matter (RDM) retention levels based upon range condition and annual precipitation. By preventing over-utilization of annual grasslands, the amount of cattle browse on woody plants and acorns should be limited, and enough residual matter should be left to provide adequate seed stock for the next growing season. This should ensure that both winter and spring forage is left for the deer. Therefore, cattle should not significantly degrade the quality of montane hardwood habitat for MIS.

About 6,123 acres or 3 percent of montane hardwood habitat within the analysis area have/will be treated with timber sale activities, and about 7,380 acres or 15 percent have/will be treated with plantation activities. The above totals may reflect some double counting of acres since both harvesting and planting may have occurred on the same piece of land during the timeframe of the analysis. Nevertheless, the totals are assumed to be representative. Treatments do not remove hardwood but impact the habitat in two ways. The first way is to reduce the amount of shrubs and small coniferous trees in the understory of the habitat. This degrades the quality of the habitat by reducing cover and browse for deer. Nevertheless, this impact is temporary. If the area was previously high in shrubs, adequate cover would likely be provided within a year since shrubs tend to sprout back in that timeframe. The resulting habitat would be improved since young shrubs are more palatable and may provide better cover. The second way montane hardwood habitat can be impacted by timber activities is by removing conifers that are competing with hardwoods. This improves the vigor of oaks and can ultimately provide more acorn mast and browse for deer consumption.

About 22,274 acres of prescribed burns have occurred in the analysis area, with about 7,974 acres occurring in montane hardwood habitat. Treated acres have and will benefit the habitat by: (1) releasing oaks from competing conifers; (2) controlling the buildup of fuels, acorn destroying insects, and root-rotting fungi; and (3) preparing a favorable seedbed. Only about 4 percent of the habitat within the analysis area has/will benefit with prescribed burn treatments.

Finally, about 55,605 acres of wildfires have occurred in the analysis area, with about 21,352 acres occurring in montane hardwood habitat. The wildfires likely burned hot enough to completely consume the above ground portion of trees and even kill the below ground portion of sprouting species such as oaks. It is likely that up to about 10 percent of the habitat may have been lost. Nevertheless, favorable seed beds were likely created, allowing the habitat to re-establish. However, it will take many decades for the large oak component of the habitat to

return. While beneficial large snags would have been created, these snags have/will eventually fall over and replacements will not be available for many decades. According to historical fire records of the High Sierra Ranger District, it is likely that about 1,866 additional acres of wildfire will occur on the district in the foreseeable future. This acreage is assumed for the Bass Lake RD, as well. Nevertheless, considering past trends, foreseeable wildfires are not anticipated to impact a significant portion of the habitat.

Table 3- 194 below summarizes the differences that would occur within montane hardwood habitat under each alternative.

Table 3- 194. Indicators per Alternative for Montane Hardwood Habitat.

	Acres Open to Motorized Cross-country Travel	Miles of NFTS and Other Private/Public Roads and Motorized Trails (added miles included in total above)	Miles of NFTS Roads and Motorized Trails Closed Year-round and Seasonally	Miles of Unauthorized Routes that Can Receive Motorized Travel	Route Density (mi./sq. mi.)	Acres of Managed Open Areas (added Open Areas included in total above)	Acres of Unauthorized Open Areas that Can Receive Motorized Travel	Acres and Percent Habitat Impacted by a Decrease in Effectiveness for MIS
Alt 1	202,836	576 (+0)	59.5	112	2.16	2 (+0)	57	150,928 =74%
Alt 2	0	588 (+12)	102.5	0	1.84	2 (+0)	0	91,013 = 45%
Alt 3	0	576 (+0)	59.5	0	1.81	2 (+0)	0	101,671 =50%
Alt 4	0	584 (+8)	134.5	0	1.83	4 (+2)	0	79,819 = 39%
Alt 5	0	595 (+19)	114	0	1.87	31 (+29)	0	93,038 = 46%

Mule Deer

The MIS chosen for this habitat type is the mule deer. The mule deer is found in oak-associated hardwood and hardwood/conifer in the Sierra Nevada, comprised of montane hardwood (MHW) and montane hardwood-conifer (MHC) as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG 2005). Mule deer range and habitat includes coniferous forest, foothill woodland, shrubland, grassland, agricultural fields, and suburban environments (CDFG 2005). Many mule deer migrate seasonally between higher elevation summer range and low elevation winter range (Ibid). On the west slope of the Sierra Nevada, oak-associated hardwood and hardwood/conifer areas are an important winter habitat (CDFG 1998).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trend

As determined in the MIS Report for Travel Management (Strand and Sanchez 2010), current motorized travel on the Sierra National Forest is affecting up to 153,649 acres of montane hardwood habitat or 19 percent of the acres available within the Sierra Nevada bioregion. The result is reduced habitat effectiveness for mule deer through disturbance, avoidance, and abandonment of habitat. As previously discussed, affected acres were derived by summing the acres of habitat impacted by existing and added motorized roads, motorized trails and Open Areas. As reasoned in the MIS Report, acres of habitat that are only occasionally traversed by cross-country travel (i.e. no unauthorized routes exist upon them) were not included in the calculation of affected acres. Acres of habitat impacted by roads and motorized trails were derived by placing a ¼ mile buffer along all roads and motorized trails that are open year-round. Roads and motorized trails that are closed either year-round or seasonally were not included in the calculation of affected acres for deer, as reasoned in the MIS Report. A ¼ mile buffer is conservative and likely overestimates the percent of habitat affected. Therefore, it is likely that less than 19 percent of the habitat within the Sierra Nevada bioregion has been affected by motorized travel on the SNF. An assumption was made in the MIS Report that effects upon MIS habitats that are 5 percent or greater are significant and likely affect habitat and population trends. As such, motorized travel on the SNF has likely affected habitat effectiveness, and may have affected distribution of mule deer at the bioregional level.

The Travel Management Project would continue to directly, indirectly, and cumulatively affect up to 79,819 acres of montane hardwood habitat (lowest) under Alternative 4 and 150,928 acres (highest) under the No Action Alternative. As discussed above, the acres affected are likely less since a conservative approach was taken for the calculation of affected acres. Alternative 4 would have the least effect (likely less than 10 percent), followed by the Proposed Action alternative (likely less than 11 percent), Alternative 5 (likely less than 12 percent), and Alternative 3 (likely less than 13 percent). The No Action alternative would have the greatest effect (likely less than 19 percent). Because all of the alternatives would continue to affect more than 5 percent of the habitat, it is assumed that the Motorized Travel Management Plan would continue to adversely affect habitat effectiveness, and may affect the distribution of mule deer at the bioregional level. The majority of effects would occur from existing roads, motorized trails and Open Areas (and under Alternative 1, unauthorized routes that could receive use). Only an insignificant amount (1 percent or less) would be due to added roads, motorized trails and Open Areas.

The Motorized Travel Management Plan would **not** result in a change of: (1) habitat acres; (2) canopy cover class; or (3) CWHR size class. However, as mentioned above, effectiveness of the habitat would be impacted due to: (1) human disturbance upon the deer, and (2) habitat avoidance and abandonment. Nevertheless, NFTS roads and motorized trails in areas determined to be critical to deer by the California Department of Fish and Game (winter range, holding areas, and population centers) currently are and would continue to be closed either year-round or

seasonally during periods of deer use. Because of this, and because montane hardwood habitat is not the only habitat utilized by deer, impact upon mule deer at the bioregional level is likely less than the impact determined for montane hardwood habitat. Therefore, the Motorized Travel Management Plan may not significantly affect the distribution of mule deer at the bioregional level even though it likely affects montane hardwood habitat effectiveness at the bioregional level.

Riparian-Associated Species

The bald eagle, great gray owl, willow flycatcher, western red bat, Townsend's big-eared and yellow warbler will all be addressed under this section. However, it is important to note that these species represent different types of riparian habitat. The SNF MIS Amendment (2007) classifies riparian habitat as montane riparian vegetation (MRI) and valley riparian vegetation (VRI). Only MRI exists on the SNF. Such vegetative types typically occur along streams: Therefore, throughout the remainder of this section, this type of riparian habitat will be referred to as streamside riparian habitat. Gaines et al (2003) considers meadows and habitat that occurs along large bodies of water as being riparian habitat, as well. Therefore, data provided for the species below is a compilation of the streamside riparian habitat and meadow habitat types analyzed in the MIS Report (Strand and Sanchez 2010), as well as other data compiled from GIS wildlife and vegetative layers. As explained in the MIS Report, the acres of streamside riparian habitat underestimate the amount of habitat available because it is impossible to discern all the little slivers of MRI that exist.

Bald Eagle – Affected Environment

The bald eagle requires large bodies of water or free-flowing rivers with abundant fish, and adjacent snags or other perches. It nests in large old growth or dominant live trees with open branchwork. It nests most frequently in stands with less than 40 percent canopy cover. In California, 87 percent of nest sites are within 1 mile of water (Zeiner et al 1990).

The bald eagle was delisted from the list of Federally-threatened and endangered animal species in August 2007 and subsequently placed on the Regional Forester's Sensitive Species list. The bald eagle continues to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (MBTA). There are five known bald eagle nests on the SNF at this time (Bass Lake (2 nests), Shaver Lake (SCE), Huntington Lake and Lake Edison). Additional information can be found in the BE/BA (Sorini-Wilson, 2010).

Bald Eagle – Environmental Consequences

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the bald eagle. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to the NFTS adjacent to current nest sites.
- Miles of roads and motorized trails added to the NFTS within ¼ mile of known bald eagle sites.
- Number of eagle nests within 1/4 mile of roads and motorized trails added to NFTS.
- Number of Open Areas added to the NFTS adjacent to current nest sites.

Direct and Indirect Effects

Disturbance: The U.S. Fish and Wildlife Service developed National Bald Eagle Management Guidelines (2007) to advise land managers and others of protective provisions to minimize impacts to bald eagles, particularly where there may constitute “disturbance,” which is prohibited by the Bald and Golden Eagle Protection Act.

The bald eagle guidelines do not provide protection provisions for general motorized use, but it does provide the following guidelines for off-road vehicle use. During the breeding season, do not operate off-road vehicles within 300 feet of the nest. In Open Areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet (USFWS 2007).

Habitat loss, fragmentation and edge effects: Roads may affect an animal’s reproductive success. Productivity of bald eagles in Oregon and Illinois declines with proximity to roads and they preferentially nest away from roads. The reduced nesting success of eagles in proximity to roads may be more a function of the presence of humans than of the road itself (Trombulak and Frissell 2000).

The ZOI used for bald eagle is 1/4 mile buffer around known nest sites.

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative. Therefore, it is assumed the route proliferation would continue over the short and long term. Under this alternative the riparian associated species would have habitat degraded or removed because cross-country travel would continue and not be confined to particular roads and motorized trails. The protection measures that are set up for bald eagle would not be effective because cross-country use would continue.

There are nine roads and motorized trails in Alternative 1 that are within the ZOI of 1/4 mi of two different bald eagle nests. The actual nest is 3/4 mile from the roads and motorized trails locations.

For the Bass Lake nest site, a current Forest Order to close the route from January 1 to August 31 or 3 weeks after chicks are known to have fledged would continue to be enacted on an annual basis. This action has been sufficient to protect the nesting activity over several years as evidence by this pair’s successful fledging of one to two young per year.

Nevertheless, unless cross-country use is repeated in the same area, creating unauthorized routes and Open Areas, impact would not likely be high enough to cause avoidance behaviors or reduce reproductive success.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or Open Areas proposed for addition to the NFTS under this alternative; therefore, there would be no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the current season of use on NFTS roads and motorized trails. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on eagle within the zone of influence for each eagle area and associated habitat.

ALTERNATIVE 2 - PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the Forest under this alternative. Prohibition of cross-country would limit motor vehicle use to current NFTS roads. It would limit the proliferation of unauthorized routes.

Prohibition of cross-country motor vehicle travel would allow habitat to recover where degradation may be occurring. If it is prohibited, 446 miles of roads and motorized trails would have the potential to be restored. On some roads and motorized trails, recovery will achieve conditions similar to undisturbed areas within 5 to 30 years (see Soil Resource section). There are no unauthorized routes within bald eagle habitat. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: To reduce disturbance to nesting bald eagles, land management agencies typically implement restrictions on certain activities within a buffer of nests. Latest recommendations in the design criteria from USFWS (2007) suggest 660 feet where there is increased visibility and exposure to noise. To minimize disturbance to foraging bald eagles, roads and motorized trails should be minimized or not allowed between nesting or roosting sites and foraging sites.

No roads, motorized trails or Open Areas will be added in bald eagle habitat; therefore, there will be no direct or indirect effects to the bald eagle under this alternative.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Alternative 2 would decrease impacts occurring from current management of the NFTS. It would increase miles of roads and motorized trails that are closed year-round from 236 to 446 miles, and increase miles of NFTS roads and motorized trails that are seasonally closed from 470 to 986 miles. Combined, closure periods would be changed on 709 miles of prohibited or seasonally-closed roads. The changes listed above should not affect the known bald eagles because they are not in these areas at this time.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Effects Due to Additions to the NFTS: Under this alternative, there would be no roads and motorized trails or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to bald eagles.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS; therefore, the effects would be the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes near bald eagles. This would reduce the risk of direct and indirect effects to bald eagles from motorized travel over the short and long term. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: There are no roads or motorized trails proposed for addition to the NFTS near known bald eagle nests sites; however, when the ZOI is applied there is one route (PK-06y) that is within 1/4 mile. None of the proposed Open Areas are within bald eagle habitat.

The bald eagle measures from Fish and Wildlife Service (U.S. Fish and Wildlife Service 2007) will be implemented which will provide further protection and are listed in the project record and under 'disturbance' on the previous page for bald eagle.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Seasonal closures and roads and motorized trails closed year-round would decrease human-caused disturbances to birds during this critical time.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes near bald eagles. This would reduce the risk of direct and indirect effects to bald eagles from motorized travel over the short and long term. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: There are no roads and motorized trails proposed for addition to the NFTS near known bald eagle nests sites; however, when the ZOI is applied there is one route (PK-06y) that is within 1/4 mile. There are no Open Areas within bald eagle habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Alternative 5 would be the same as Alternative 4.

Cumulative Effects

Additional effects upon bald eagles occur from timber and fuels management activities and wildfires in late seral coniferous forest habitats that are within a mile of large bodies of water or free-flowing water with abundant fish. Management activities create noise disturbance, and may remove some roosting trees or snags. However, mitigation and design measures minimize this impact. Refer to the cumulative effects section for late seral open and closed canopy coniferous forest habitats provided above under the late-successional forest associated species for degree of impact.

Great Gray Owl

Great gray owls use meadows for foraging and typically nest within 600 feet of meadow edge. Effects upon both foraging and nesting habitat are discussed above under late-successional forest associated species.

Willow Flycatcher – Affected Environment

In California, the willow flycatcher is a rare to locally uncommon, summer resident in wet meadow and montane riparian habitats at 600-2500 m (2000-8000 ft) in the Sierra Nevada and Cascade Range (CWHR 2005). Willow flycatcher populations in the Sierra Nevada are considered to be at risk (USDA-FS 2001). Historically, willow flycatchers were once common throughout the Sierra Nevada. The current distribution of the willow flycatcher has been drastically reduced compared to historic distributions. A ten year demographic analysis indicates that the Sierra Nevada willow flycatcher populations are continuing to decline. With the exception of a few sites, the majority of areas where willow flycatchers have been located support low numbers of breeding territories and some as low as one to two pairs of breeding individuals.

Willow flycatcher breeding habitat is characterized as montane wetland shrub habitat where there is a prevalence of willows and montane meadows with standing or flowing water or highly saturated soils throughout the nesting season (Green, et al. 2003). A study by Cain (2001) indicated that meadow wetness may assist in successful nesting of willow flycatcher by inhibiting potential forest and edge predators from accessing willow flycatcher nests. Meadow wetness may also be important for willow flycatcher insect prey species. Additional information can be found in the BE/BA (Sorini-Wilson, 2010).

Willow Flycatcher - Environmental Consequences

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the willow flycatcher. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to the NFTS that intersect with willow flycatcher occupied and emphasis meadows, and willow flycatcher habitat (meadows and streamside riparian habitat).
- Number of Open Areas added to the NFTS that intersect with willow flycatcher occupied and emphasis meadows, and willow flycatcher habitat (meadows and streamside riparian habitat).
- Number of roads and motorized trails within ¼ mile of an occupied willow flycatcher meadow.

Direct and Indirect Effects

Disturbance: Wildlife species associated with riparian habitats are particularly vulnerable to the effects of recreation activities on their habitat because of the concentration of these activities in riparian areas. Riparian habitats occur in narrow, linear configuration that is often traversed by roads and trails. Because of the availability of open water, cover and concentrated food sources, these habitats are used by wildlife disproportionately to their availability (Gaines et al. 2003, USDA-FS 1996).

Habitat loss, fragmentation and edge effects: The Willow Flycatcher Conservation Assessment (Green et al. 2003) identified roads as one of the leading contributing factors responsible for the loss and degradation of willow flycatcher habitat. Specifically, roads (dirt-surfaced or paved), intercept surface and subsurface hydrological flow. Meadow desiccation occurs when hydrological flows are intercepted and redirected which may result in long-term habitat loss or degradation. Roads may have a negative impact on meadow hydrology, especially when roads which bisect meadows and have associated drainage structures to maintain road conditions. Human disturbance associated with road and trail motorized use may also affect willow flycatcher nesting success. Roads also provide increased access to humans which may directly and indirectly affect willow flycatcher productivity. Roads provide access for livestock grazing and often meadows occupied by willow flycatchers are key forage areas for livestock. Livestock grazing has long been identified as contributing to the decline in willow flycatcher populations as it relates to grazing impacts on willow and meadow habitat, as well as potential direct impacts from cattle coming in direct contact or destroying nest sites.

There are unauthorized roads and motorized trails within the Riparian Conservation Area (RCAs) as described in the hydrology section. This could be a potential impact to the habitat because vegetation is possibly being trampled and destroyed. RCAs cover a larger area than is assigned to the Riparian habitat under MIS (see MIS report, Strand and Sanchez 2010). The RCA buffer can

range from 150 to 300 feet depending on the class of stream. When a creek has year-round water there will be a larger buffer than one that is ephemeral or intermittent.

Recreation activities in willow flycatcher habitat can have effects similar to livestock grazing, although to a lesser extent and intensity in many cases. In addition, the supplemental food provided by developed and dispersed recreation in close proximity to riparian areas and meadows, as well as movement corridors provided by trails, may indirectly affect willow flycatchers through an increase in local abundance of brown headed cowbirds as well as nest predators, both native (such as jays, squirrels and chipmunks) and non-native (cats, dogs) (SNFPA FEIS, USDA-FS 2001 Ch 3 Part 4, pg. 156-157).

Table 3- 195 below summarizes differences in the amount of roads and motorized trails that intersect occupied willow flycatcher (WIFL) under each alternative.

Table 3- 195. Roads and Motorized Trails that Intersect with Willow Flycatcher (WIFL) Occupied Meadow Sites

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
0.51 miles or 9 intersecting roads and motorized trails	0 mi	0 mi	0 mi	0 mi

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative. Therefore, it is assumed the route proliferation would continue over the short and long term and the effects of the unauthorized routes would be similar to those discussed under adding roads and motorized trails to the NFTS. Under Alternative 1, there are 179 miles of unauthorized routes in RCAs (see hydrology section). The riparian associated species would have habitat degraded or removed because cross-country travel would continue and not confined to particular roads and motorized trails.

Alternative 1 would allow continued cross-country travel within 10,330 acres of wet meadow. Additional information can be found in the MIS report (Strand and Sanchez 2010). Willow flycatchers utilize meadows as part of their habitat. It is assumed a portion would be within suitable willow flycatcher habitat.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or Open Areas proposed for addition to the NFTS under this alternative; therefore, there would be no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the current season of use on NFTS roads and motorized trails. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be a negative effect on willow flycatchers within the zone of influence and associated habitat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country would limit motor vehicle use to NFTS roads and motorized trails. It would limit the proliferation of unauthorized routes. Prohibition of cross-country motor vehicle travel would allow habitat to recover where degradation may be occurring. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: None of the roads and motorized trails proposed for addition to the NFTS would be within or adjacent to streamside riparian habitat. Less than 0.1 mile would be added to meadow habitat. There are no occupied or emphasis meadows within ¼ mile of roads and motorized trails to be added. There would be no Open Areas within willow flycatcher habitat; therefore, there are no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Changes to year-round roads and motorized trails closures would not decrease impacts upon streamside riparian habitat. On the contrary, less roads and motorized trails within and adjacent to the habitat would be closed. Only 4 versus 5 acres would be protected with year-round roads and motorized trails closures. Note: Effects of roads and motorized trails upon streamside riparian habitat are discussed in terms of acres rather than miles because the mileage involved is small and does not always reflect the differences among alternatives. Changes to seasonal closures may decrease impacts since 519 more miles would be seasonally closed. Closure and removal of roads has been found to effectively provide wildlife security and increase the amount of available wildlife habitat (Wildlands CPR 2006).

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to the species within this group by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The potential impacts discussed under Alternative 1 from cross-country travel would not occur.

Effects Due to Additions to the NFTS: Under this alternative, there would be no roads, motorized trails or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to willow flycatchers.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS; therefore, the effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes near willow flycatcher habitat. This would reduce the risk of direct and indirect effects to willow flycatcher from motorized travel over the short and long term. Restricting cross-country travel would reduce incidence of meadow encroachment by OHVs and associated impacts. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: An insignificant amount of roads and motorized trails encompassing 0.001 ZOI acres would be added to streamside riparian habitat, and less than 0.1 miles would be added to meadow habitat. There are no occupied or emphasis WIFL sites affected by roads and motorized trails in this alternative; therefore, there would be no direct or indirect effects to the willow flycatcher. Eleven Open Areas are being added under this alternative; however, none are within willow flycatcher habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see

assumptions in Section 3.13.1). This alternative would benefit 22 versus 5 acres of streamside riparian habitat by closing more miles of NFTS roads and motorized trails within and adjacent to the habitat year-round. Furthermore, more seasonal closures would occur since this alternative would impose season of use on 1568 versus 470 miles of NFTS roads and motorized trails. As stated in the MIS Report (Strand and Sanchez 2010) year-round and seasonal closures under this alternative would provide higher levels of protection to meadows, as well. Zones of influence would be significantly decreased, and less acres of habitat would be taken out of effective wildlife use. Seasonal closures would decrease human-caused disturbances to wildlife during reproductive time.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes near willow flycatcher habitat. This would reduce the risk of direct and indirect effects to willow flycatcher habitat from motorized travel over the short and long term.

Effects Due to Additions to the NFTS: Approximately 0.02 miles (9 ZOI acres) of roads and motorized trails are proposed for addition to the NFTS within streamside riparian habitat. Less than 0.1 miles would be added to meadow habitat. There is one motorized trail (JM-21z) that is within ¼ mile of an occupied meadow for the willow flycatcher. There are 838 acres of occupied willow flycatcher affected by Alt 5 with roads and motorized trails proposed for addition to the NFTS within ¼ mile of an occupied willow flycatcher meadow (Markwood meadow). No emphasis habitat would be affected. There would be no Open Areas within willow flycatcher habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). More roads and motorized trails within and adjacent to streamside riparian habitat (encompassing 21 versus 5 ZOI acres) would be closed year-round. More roads and motorized trails would have a season of use (1625 versus 470). Zones of influence would be significantly decreased on these roads and motorized trails and less acres of habitat would be taken out of effective MIS use. Seasonal closures would decrease human-caused disturbances to wildlife during this critical time.

Cumulative Effects

Wildfire, fuels reduction, and cattle grazing are the primary activities/events that may cause cumulative effects upon willow flycatchers. Impacts from management activities should be minimized by standards and guidelines and/or mitigation and design measures. Refer to the cumulative effects section for the MIS streamside riparian habitat (provided below) and the MIS meadow habitat (provided in the aquatics section) for degree of impact.

Western Red Bat – Affected Environment

Western red bats appear to be highly associated with intact riparian habitat, particularly willows, cottonwoods and sycamores. Winter habitat includes western lowlands and coastal regions south of San Francisco Bay. This bat roosts in tree foliage and occasionally shrubs along edge habitats adjacent to streams, fields or urban areas. Preferred roosts (for all roost types) are protected from above and located above dark ground cover and generally from 2 to 40 feet above ground. Roosts are generally hidden from view from all directions except below (to allow free flight from the

roost). Red bats tend to roost out on the edge of the foliage at approximately one third of the height of the tree and mostly in the largest cottonwoods. Red bats prefer edge or habitat mosaics that have trees for roosting and Open Areas for foraging. Red bats have also been recorded using caves and mines or buildings (USDA-FS 2001).

Foraging occurs over grasslands, shrublands, open woodlands and forest and croplands; ridgetops to densely wooded timber stands, regeneration areas, powerline rights-of way, highways and old logging roads. Prey items mostly include moths, crickets, beetles and cicadas and may be taken from high above treetops to nearly ground level. They appear to have high foraging site fidelity. They have been recorded foraging under orchard and hardwood trees where understory is open. They require water (USDA-FS 2001). Additional information can be found in the BE/BA (Sorini-Wilson 2010).

Western Red Bat – Environmental Consequences

The following indicators were chosen to provide a relative measure of the direct and indirect effects to Western red bat. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

Miles of roads and motorized trails within riparian habitat

Direct and Indirect Effects

Disturbance: As discussed above, wildlife species associated with riparian habitats are particularly vulnerable to the effects of recreation activities on their habitat because of the concentration of these activities in riparian areas. Riparian habitats occur in narrow, linear configuration that is often traversed by roads and trails. Because of the availability of open water, cover and concentrated food sources, these habitats are used by wildlife disproportionately to their availability (Gaines et al. 2003, USDA-FS 1996).

Habitat loss, fragmentation and edge effects: The western red bat utilizes riparian habitat similar to the type delineated for MIS (streamside riparian). Therefore, impacts upon that habitat (as discussed below) would also impact the bat. Of the 264 acres of streamside riparian habitat delineated for MIS, there are 210 acres that are within the elevation band 3000 feet or below and considered suitable habitat for the Western red bat.

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative; therefore, it is assumed the route proliferation would continue over the short and long term. Under Alternative 1, there are 179 miles of unauthorized routes in RCAs (see Water Resources section). The riparian associated species would have habitat degraded or removed because cross-country travel would continue and not confined to particular roads and motorized trails.

Alternative 1 would allow continued cross-country travel within 10,330 acres of wet meadow. Additional information can be found in the MIS report (Strand and Sanchez 2010). It is assumed a portion would be within suitable Western red bat habitat.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or Open Areas proposed for addition to the NFTS under this alternative; therefore, there would be no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the current season of use

on NFTS roads. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on Western red bat within the zone of influence and associated habitat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country use would limit motor vehicle use to NFTS roads and motorized trails. It would limit the proliferation of unauthorized routes. Prohibition of cross-country motor vehicle travel would allow habitat to recover where degradation may be occurring. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: No roads and motorized trails would be added to streamside riparian habitat. No Open Areas would exist within Western red bat habitat; therefore, there would be no direct or indirect effects.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). The Western red bat forages in riparian habitat; therefore, the bat would benefit by closing roads and motorized trails within streamside riparian habitat. Under this alternative, less acreage (4 versus 5 acres) would benefit by year-round closures. Nevertheless, more miles of roads and motorized trails would be seasonally closed since this alternative imposes a season of use on 986 versus 470 miles of roads and motorized trails.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to the species within this group by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The potential impacts discussed under Alternative 1 from cross-country travel would not occur.

Effects Due to Additions to the NFTS: Under this alternative, there would be no roads, motorized trails or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to Western red bat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS; therefore, the effects would be same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes near Western red bat habitat. This would reduce the risk of direct and indirect effects to Western red bat from motorized travel over the short and long term. Restricting cross-country travel would reduce incidence of meadow and streamside encroachment by OHVs and associated impacts.

Effects Due to Additions to the NFTS: Fifty-one (51) miles of NFTS roads and motorized trails and 11 Open Areas, totaling 37 acres are proposed for addition to the NFTS under this alternative; however an insignificant amount of roads and motorized trails would be added to streamside riparian habitat impacting only 0.001 acres of the habitat. No Open Areas exist within

the habitat and none would be added. There is no suitable habitat being affected by roads and motorized trails in this alternative; therefore, there would be no direct or indirect effects to the Western red bat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). This alternative would benefit 22 versus 5 acres of streamside riparian habitat by closing more miles of NFTS roads and motorized trails within and adjacent to the habitat year-round. Furthermore, more seasonal closures would occur since this alternative would impose season of use on 1568 versus 470 miles of NFTS roads and motorized trails. Seasonal closures would decrease human-caused disturbances to wildlife during this critical time.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes near Western red bat habitat. This would reduce the risk of direct and indirect effects to Western red bat habitat from motorized travel over the short and long term. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Approximately 0.02 miles (9 ZOI acres) of roads and motorized trails are proposed for addition to the NFTS within streamside riparian habitat. No Open Areas exist and none would be added.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). This alternative would benefit from 21 versus 5 acres of streamside riparian habitat by closing more miles of NFTS roads and motorized trails within and adjacent to the habitat year-round. Furthermore, more seasonal closures would occur since this alternative would impose season of use on 1625 versus 470 miles of NFTS roads and motorized trails. Seasonal closures would decrease human-caused disturbances to wildlife during this critical time.

Cumulative Effects

Recreational activities, special uses, fuels reduction, and timber management may create noise disturbance. They may also disturb the bat during winter hibernation, since these bats have been noted to roost in leaf litter. This impact does not apply to logging since it does not occur during winter months. As explained under the cumulative effects section for the streamside riparian habitat, cattle may impact the habitat (and thereby the bat) but not significantly so. They are removed from allotments during winter months; therefore, they do not disturb bats roosting in leaf litter. Timber and fuels management activities likely benefit the habitat (as explained under the cumulative effects section for the streamside riparian habitat). Thereby, they likely provide some benefit to the bat. Wildfire imposes cumulative effects, as well. Refer to the cumulative effects section for streamside riparian habitat for a discussion of the degree of impacts from these activities/events.

Townsend's Big-eared Bat – Affected Environment

The Townsend's big-eared bat requires roosting habitat that is inaccessible to humans because individual bats roost on walls or ceilings often near entrances. They rarely seek shelter in crevices as many other bat species do. If undisturbed, individuals will frequently roost less than three

meters off the ground, and have been found in air pockets under boulders on cave floors. Populations of this species are threatened by habitat loss, vandalism, and disturbance by cave explorers at maternity and hibernation roosts. Human disturbance can cause permanent abandonment of roost sites. Within a few years of publication of a guidebook to the caves of Colorado, human visitation to one particular cave increased so much that the colony of *C. townsendii* found there eventually disappeared.

Their most typical habitat is arid western desert scrub and pine forest regions. In terms of dominant vegetation type, this bat occurs in a variety of habitats, including desert scrub, sagebrush, chaparral, deciduous and coniferous forests. Their distribution is strongly associated with the availability of caves or cave-like roosting habitat such as old mines. They may also use hollow trees. Because of this, some of the green forest snag habitat information (following the riparian section) is brought forward. In general, the most serious factor leading to population declines in bats is loss and/or disturbance of suitable roosting habitat, and Townsend's big-eared bats appear to be among the most dependent of all North American bats on abandoned or inactive mines. Concentrations also occur in areas with substantial surface exposures of cavity forming rock such as limestone, but such areas are rare in the West. The species is occasionally found in old, mostly abandoned buildings and other human made cave-like structures, but these areas are mostly used at night while the animals are foraging. The bats are inactive during the day, and stay mostly in caves or mine tunnels. There are no known caves within the analysis area, but mines exist within it.

These bats require habitat for day roosts, night roosts, and hibernation roosts. Surveys have not been conducted to determine if there are known roosts on the Sierra National Forest. The most significant roosts, which have the largest aggregations and are most critical to the survival of populations, are the winter hibernacula (both sexes), and the summer maternity roosts (entirely adult females and their young). Additionally, there are other summer roosts: Those used in the day time by males and non-reproductive females (usually containing no more than a few animals per roost), night roosts (generally at a different site than the day roost), used by both sexes as a place to rest and digest food during the night, and interim roosts (sites used in the spring before the young are born and in the fall before moving to hibernating sites).

According to a study conducted in 1997 (Fellers and Pierson 2002), bats typically followed the edge of the forest, often along riparian corridors where vegetation was predominantly Douglas-fir, California bay, and occasionally willows (*Salix*). They usually flew 10-30 m off the ground between midcanopy and near the top of the canopy. Bats favored riparian habitat long streams and smaller tributaries. Occasionally bats were found in more open habitats, typically in close association with scattered trees or large shrubs. Bats avoided grassland, both when foraging and when traveling between the roost and foraging areas. There is a high degree of fidelity to the roost site.

The big-eared bat feeds on moths, caddisflies, and other insects, detecting them by echolocation, and capturing them in flight. They forage frequently over water, and also pick insects from leaves. This bat is particularly maneuverable in flight, varying from swift darting movements to slow deliberate and hovering moves. This makes the species difficult to capture, which is one reason why so little is known about locations in Colorado and other states. Townsend's big-eared bats are late flyers. They emerge from the roost primarily after dark, an average of 45.5 minutes after sunset, and forage until the early morning hours. Additional information can be found in the BE/BA (Sorini-Wilson 2010).

As shown in USDA 2001, the species has declined due to direct killing by people and because of abandonment of roosts caused by disturbance due to explorers and vandals.

Townsend's Big-eared Bat – Environmental Consequences

The following indicator was chosen to provide a relative measure of the direct and indirect effects to the Townsend's big-eared bat. The bat utilizes riparian areas for foraging and caves and snags for roosting. The information presented below will be addressed according to riparian information as well as green snag information where appropriate. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Miles of roads and motorized trails added to the NFTS within streamside riparian and green forest snag habitat or near cave or cave-like structures

Direct and Indirect Effects

Habitat loss, fragmentation and edge effects: Snag and log reduction occurs as an indirect effect of managing roads or trails for public use. Trees posing a potential safety hazard ("hazard trees") are removed along roads and trails open for public use, as well as roads receiving concentrated use during implementation of a specific project. Hazard trees are typically dead or dying trees that occur within a 300 feet from either side of the road. This safety policy results in a reduction in snags within a zone of 300 feet from the edge of a road. This, in turn, reduces habitat quality and availability for the Townsend's big-eared bat within these roadside corridors. Hazard tree removal adjacent to lower standard roads (e.g. maintenance level 2) or motorized trails is not as common as it is adjacent to more heavily traveled roads and motorized trails (e.g. paved roads, main road corridors on the SNF).

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative. Therefore, it is assumed the route proliferation would continue over the short and long term and the effects of the unauthorized routes would be similar to those discussed under adding roads and motorized trails to the NFTS. Under this alternative, the Townsend's big-eared bat would have habitat degraded if cross-country travel were able to access cave sites and vehicles were not confined to particular roads and motorized trails.

If cross-country motorized use continued, it would be a direct effect to this bat because the public could potentially disturb habitat. It may allow access to roost sites yet undiscovered which could be subject to disturbance and potentially cause roost site abandonment.

While cross-country travel does not have significant effect upon use of habitat for this species, unauthorized routes and Open Areas associated with cross-country travel can. Open Areas that are within the habitat and roads and motorized trails that are in or less than ¼ mile from the habitat likely increase: (1) roosting and maternal sites disturbance; and/or (2) habitat avoidance. The period of greatest sensitivity occurs when bats are in their winter hibernaculum or maternal colonies. Disturbance during hibernation depletes valuable reserves. Disturbance in maternal roosts may disrupt parental attentiveness and feeding patterns; thereby increasing the chance that young may become stressed or predated upon.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or Open Areas proposed for addition to the NFTS under this alternative; therefore, there will be no direct or indirect effects to the species or the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease

in the negative effects on Townsend's big-eared bat within the zone of influence and associated habitat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to current NFTS roads. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and one Open Area (6 acres) proposed for addition to the NFTS. None are within streamside riparian habitat. The 21 miles of NFTS roads and motorized trails that would be added to green forest snag habitat are not expected to impact Townsend's big-eared bat. While hazard tree removal would reduce the amount of snag habitat available for roosting, snags are typically not used for roosting by this species. Caves and cave-like structures are the primary roosting habitat. Therefore, there are no expected direct or indirect effects to the species. If any roads and motorized trails are added which lead to where caves or mines are located, that is where there is potential for disturbance to the species; however the only known caves and mines on the Forest exist in wilderness, where roads and motorized trails would not be added.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Changes to year-round roads and motorized trail closures would not decrease impacts upon streamside riparian habitat. On the contrary, less roads and motorized trails within and adjacent to the habitat would be closed. Only 4 versus 5 acres would be protected with year-round roads and motorized trail closures. Changes to seasonal closures may decrease impacts since 519 more miles would be seasonally closed. Closure and removal of roads has been found to effectively provide wildlife security and increase the amount of available wildlife habitat (Wildlands CPR 2006).

Changes to the season of use and open and closed status are not expected to have any detectable benefit upon species that utilize green forest snag habitat. Regardless of season of use or open or closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, snags that could potentially be used for roosting by Townsend's big-eared bat would still be removed. Nevertheless, as explained above, these bats tend to use caves and cave-like structures for roosting.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to the species within this group by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic especially if roads and motorized trails go by mine areas.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to Townsend's big-eared bat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS. The effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes. This would reduce the risk of direct and indirect effects to Townsend's big-eared bats from motorized travel over the short and long term due to noise disturbance. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of NFTS roads and motorized trails and 11 Open Areas, totaling 37 acres are proposed for addition to the NFTS; however an insignificant amount would affect foraging Townsend's big-eared bats since only 0.001 acres of streamside riparian habitat would be impacted. The 27 miles of NFTS roads and motorized trails and 13 acres of Open Areas that would be added to green forest snag habitat are not expected to impact the bat as explained above. If any roads and motorized trails are added which lead to where caves or mines are located, that is where there is potential for disturbance to the species; however the only known caves and mines on the SNF exist in wilderness, where roads and motorized trails are not occurring and would not be added.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). This alternative would benefit 22 versus 5 acres of streamside riparian habitat by closing more miles of NFTS roads and motorized trails within and adjacent to the habitat year-round. Furthermore, more seasonal closures would occur since this alternative would impose season of use on 1568 versus 470 miles of NFTS roads and motorized trails. Zones of influence would be significantly decreased, and less acres of habitat would be taken out of effective MIS use. Seasonal closures would decrease human-caused disturbances to wildlife during this critical time.

Changes to the season of use and open and closed status are not expected to have any detectable impact upon species that utilize green forest snag habitat. Regardless of season of use or open and closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, snags that could potentially be used for roosting by Townsend's big-eared bat would still be removed. Nevertheless, as explained above, these bats tend to use caves and cave-like structures for roosting rather than snags.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes near Townsends big-eared bat habitat which would reduce the risk of direct and indirect effects to bat habitat from motorized travel over the short and long term. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 85 miles of roads and motorized trails and 105 acres of 20 Open Areas are proposed for addition to the NFTS. Of the 85 miles of roads and motorized trails added, only 0.02 would be within streamside riparian habitat. Of the 105 acres of Open Areas added, 52 acres would be within the habitat. The largest amount of this habitat would be affected because the highest amount of roads and motorized trails and Open Areas would be added. The 42 miles of NFTS roads and motorized trails and 52 acres of Open Areas that would be added to green forest snag habitat are not expected to impact the bat as explained above. If any roads and motorized trails are added which lead to where caves or mines are located, that is where there is potential for disturbance to the species; however the only known

caves and mines on the SNF exist in wilderness, where roads and motorized trails would not be added.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). This alternative would benefit from 21 versus 5 acres of streamside riparian habitat by closing more miles of NFTS roads and motorized trails within and adjacent to the habitat year-round. Furthermore, more seasonal closures would occur since this alternative would impose season of use on 1625 versus 470 miles of NFTS roads and motorized trails. Seasonal closures would decrease human-caused disturbances to wildlife during this critical time.

Changes to the season of use and open and closed status are not expected to have any detectable impact upon species that utilize green forest snag habitat. Regardless of season of use or open and closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, snags that could potentially be used for roosting by Townsend's big-eared bat would still be removed. Nevertheless, as explained above, these bats tend to use caves and cave-like structures for roosting rather than snags.

Cumulative Effects

Wildfires in streamside riparian habitat and green forest snag habitat pose cumulative effects upon the bat. Refer to the cumulative effects section for these habitat types for the degree of impact.

Timber management and fuels reduction activities that occur in streamside riparian habitat likely benefit the bat indirectly by modifying the habitat (Refer to the cumulative effects section for this habitat type for degree of impact). When they occur in green forest snag habitat, they remove snag roosts, but this is not believed to be a significant impact upon the bat since snags are only occasionally used for roosting by this bat. These activities may pose noise disturbance to snag-roosting bats, but as reasoned above, are not believed to be a significant impact upon the bat. They would not pose noise disturbance to bats utilizing streamside riparian habitat since the bat utilizes this habitat type at night for foraging when such activities do not occur.

Cattle may impact streamside riparian habitat (and thereby the bat) but not significantly so, as discussed in the cumulative effects section for the streamside riparian habitat.

Streamside Riparian Habitat – Affected Environment

Riparian habitat on the Sierra National Forest as designated for MIS is comprised only of montane riparian habitat (MRI). Using the 2001 vegetation coverage for the SNF, 264 acres of riparian habitat were delineated within the analysis area. It is important to note that acres are likely underrepresented since it is impossible to discern all the little slivers of this habitat type with vegetative imagery alone. Nevertheless, as explained in the MIS report (Strand and Sanchez 2010), a vegetative coverage was used to delineate acres of riparian habitat in the analysis area since that is how they were computed for the Sierra Nevada bioregion. By using the same methodology, forest data could be related to bioregional trends. The 2001 coverage revealed 264 acres of riparian habitat within the analysis area. Only 0.18 of these acres are in prohibited areas. (See Figure 1-3 for a map of those areas). Therefore, essentially the entire riparian habitat within the analysis area is currently open to cross-country motorized travel. Only about 0.05 miles of unauthorized routes (encompassing 21 ZOI acres) exist within this habitat. None were created in prohibited areas. About 1.5 miles of NFTS roads, other public roads, and private roads (encompassing 182 ZOI acres) exist in the delineated riparian habitat. Including the roads,

motorized trails, and unauthorized routes, the delineated habitat has a route density of 3.78 mi/sq.mi. No managed Open Areas exist within the habitat, and only 0.10 acres of unauthorized Open Areas exist. The unauthorized Open Areas do not exist in prohibited areas. All in all, about 203 acres of riparian habitat is impacted by roads and motorized trails and Open Areas. Nevertheless, because those acres include the ZOI of roads and motorized trails that are closed year-round (which are not considered to cause significant impacts as previously discussed), acres of riparian habitat impacted is likely closer to 198 or 75 percent.

Streamside Habitat – Environmental Consequences

Direct and Indirect Effects

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the habitat. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

- Acres of habitat available
- Acres of habitat open for cross-country motorized use
- Miles of unauthorized roads and motorized trails within the habitat, and acres of habitat encompassed by a ¼ mile zone of influence (ZOI)
- Miles of NFTS, private, other public roads and motorized trails within the habitat, and acres of habitat encompassed by a ¼ mile ZOI
- Total density (mi/sq mi) of roads and motorized trails and unauthorized routes that could continue to receive use within the habitat
- Acres of Open Areas (FS managed and unauthorized) within the habitat

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Under the No Action alternative, all 264 acres of the delineated riparian habitat would remain open for motorized cross-country travel. Occasional cross-country travel through habitat types on the SNF would not generate lasting impacts upon the habitats, nor would MIS likely avoid using areas that are only occasionally accessed by motor vehicles. However, where cross-country travel occurs in the same vicinity regularly, unauthorized routes and Open Areas are generated and impacts upon habitat and MIS use of habitat occurs. Under this alternative, cross-country travel would not be prohibited. It is assumed that the proliferation of unauthorized routes and Open Areas would continue and the effects would be similar to those discussed under adding roads and motorized trails and Open Areas to the NFTS. There would be continued use of about 0.05 miles of unauthorized routes and 0.10 acres of unauthorized Open Areas in streamside riparian habitat within the project area under this alternative.

Effects Due to Additions to the NFTS: There are no roads and motorized trails or Open Areas identified to add to the NFTS under this alternative; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads: Under this alternative, there are no proposed changes to the current season of use on NFTS roads. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effect upon streamside riparian habitat effectiveness.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and 6 acres of Open Areas are proposed for addition to the NFTS. None of the roads, motorized trails or Open Areas proposed to be added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. Under this alternative, less acreage (4 versus 5 acres) would benefit by year-round closures.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails.

Effects Due to Additions to the NFTS: Under this alternative, there would be no roads, motorized trails or areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS. Effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of roads and motorized trails and 37 acres of Open Areas are proposed for addition to the NFTS. Of the 51 miles of roads and motorized trails added, only an insignificant amount (encompassing only 0.001 ZOI acres) are within or adjacent to streamside riparian habitat. None of the Open Areas added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 77 percent more roads and motorized trails within and adjacent to the

habitat would be closed year-round under this alternative; therefore, about 17 acres of streamside riparian habitat would benefit by increased effectiveness for MIS.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, there are 85 miles of roads and motorized trails and 105 acres of Open Areas proposed for addition to the NFTS. Of the 51 miles of roads and motorized trails added, about 0.02 miles would be added to riparian habitat. None of the Open Areas added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 64 percent more roads and motorized trails within and adjacent to the habitat would be closed year-round under this alternative; therefore, about 16 acres of streamside riparian habitat would benefit by increased effectiveness for MIS.

Streamside Riparian Habitat – Cumulative Effects

As discussed above, roads, motorized trails and Open Areas within ¼ mile of the habitat are likely to increase: (1) nesting, resting, and foraging disturbance; (2) nest predation; and/or (3) habitat avoidance. Those impacts are most significant during the reproductive seasons and may reduce reproductive success. The reproductive season of the yellow warbler occurs between mid-April to early August. The period of greatest sensitivity occurs during nest building, and incubation when the individual is more likely to abandon the site (Gotmark 1992 in Knight and Gutzwiller 1995). Another period of sensitivity is the nestling/fledgling period when parental attentiveness may be disturbed; thereby, disrupting feeding patterns and increasing the chance that young may become stressed and/or predated upon.

The higher the road and motorized trail density, the greater the amount of habitat taken out of effective MIS use. When density exceeds a certain point, the habitat does not provide any place for undisturbed reproduction, foraging, or resting to occur. If density remains too high, habitat is likely avoided. Species population can be reduced as a result. Existing motorized travel has created a route density of 3.78 mi/sq.mi. within the delineated streamside riparian habitat and has likely impacted as much as 75 percent of it by decreasing its effectiveness for MIS. A comparison of route densities and percent habitat impacted is provided in the table below.

Other activities within the analysis area cumulatively affect the habitat. There are currently about 100 developed campgrounds and day use sites; other developed sites such as boat launches, and trailheads; and recreational special use sites such as pack stations, resorts, camps, and summer home tracts that exist within the analysis area. Together, they encompass roughly 3,242 acres. Because recreational use of riparian habitat is disproportionately high in comparison to the amount of acres available, it is reasonable to assume that a significant portion of the recreational and special use sites exist in riparian habitat. Nevertheless, the amount of habitat impacted is not likely significantly higher than that identified for roads and motorized trails since a ¼ ZOI was

analyzed for all roads and motorized trails. In addition to recreational and special use sites, about 489 miles of non-motorized trails exist within the analysis area. They likely impact MIS use of riparian habitat to some degree. Studies show that wildlife flush more readily by foot travel than by motorized travel Knight and Gutzwiller 1995).

There are 28 active cattle allotments, encompassing 743,247 acres, within the analysis area. They permit 17,000 animal unit months (AUMs). Cattle could potentially cause cumulative effects upon streamside riparian habitat within the analysis area. They trail along portions of streams and natural lakes and disrupt vegetative growth by grazing/trampling riparian forbs and grasses, and browsing new growth of woody riparian vegetation. Browse and trampling is limited, however, by grazing utilization standard and guidelines (S&Gs). S&G #121 (SNFPA ROD, p.66) protects woody riparian vegetation by allowing browse on: (1) no more than 20 percent of annual leader growth on mature plants and (2) no more than 20 percent of individual seedlings. Furthermore, S&G #121 requires livestock to be removed when browsing indicates a change in preference from herbaceous vegetation to woody riparian vegetation. S&G #103 (SNFPA ROD, p.63) protects riparian vegetation from trampling by preventing disturbance from exceeding 20 percent of a stream reach, natural lake, or pond shoreline. Both of these S&Gs limit impact upon riparian vegetation to 20 percent. While impact to streamside riparian habitat could be as high as 20 percent, it is likely less. The upper 20 percent limit would likely be attained in meadows well before it is attained in streamside riparian habitat. Thus cattle would likely be removed from the allotments well before streamside riparian habitat could be impacted by 20 percent or more. Therefore, cattle are not expected to cause a significant cumulative impact upon streamside riparian habitat.

None of the streamside riparian habitat that was delineated within the analysis area has/will be treated with timber sale activities, and only about 10 acres or 4 percent have/will be treated with plantation activities. Impact from management activities is minimized in streamside riparian habitat through SMZ protection measures and project design measures. No mechanical equipment is allowed in SMZs, 50 percent ground cover must be maintained, and shade canopy cannot be modified in such a manner as to adversely affect water temperature. Thus, disturbance to riparian vegetation is minimized. The limited amount of treatment that does occur in streamside riparian habitat likely benefits individual woody riparian plants by opening up the canopy. Woody riparian vegetation is shade intolerant, and vegetative competition decreases its growth, vigor, and regeneration.

About 22,279 acres of prescribed burns have occurred in the analysis area. While prescribed burns are not started in SMZs, and typically go out before reaching them, they are typically encouraged to creep into about 10 percent of SMZs within a burn unit. Creeping is encouraged in steep drainages where wildfires may make a run. Within the 10 percent where creeping is encouraged, only about 15 percent of the vegetation is typically scorched because ground and fuel moisture levels are higher when underburns are implemented (McCandliss 2008). All in all, it is likely that only about 2 percent of streamside riparian habitat within the analysis area has/will be impacted by prescribed fires (Note: The 2 percent was derived by taking 15 percent of 10 percent). Treatments that do occur within the habitat would likely be beneficial since woody riparian vegetation is not shade tolerant and prescribed burns would open up the area so they could readily sprout and grow.

Finally, about 55,605 acres of wildfires have occurred in the analysis area. Only about 37 acres of streamside riparian habitat has been impacted by wildfires since 1988, and these occurred in the Dinkey-Kings area. It is likely that additional wildfires could impact some portion of the habitat. According to historical fire records of the High Sierra Ranger District, it is likely that about 1,866 additional acres of wildfire will occur on the district in the foreseeable future. This acreage is assumed for the Bass Lake RD, as well. Impact could be detrimental or beneficial

depending on post-fire conditions. If the fire is not too hot and a favorable seed bed is established, habitat would re-establish (provided a nearby seed source is available) and be rejuvenated. Where such conditions do not exist, habitat would be lost. Based upon wildfire records, it is not anticipated that future fires would impact a significant amount of streamside riparian habitat. Table 3- 196 below summarizes the differences that would occur within the streamside riparian habitat that was delineated under each alternative.

Table 3- 196. Riparian Habitat Indicators by Alternative

	Acres Open to Motorized Cross-country Travel	Miles of NFTS and other Private/Public Roads and Motorized Trails (added miles included in total above)	Miles of NFTS Roads and Motorized Trails Closed Year-round	Miles of Unauthorized Routes that Can Receive Motorized Travel	Route Density (mi./sq. mi.)	Acres of Managed Open Areas (added Open Areas included in total above)	Acres of Unauthorized Open Areas that Can Receive Motorized Travel	Acres and Percent Habitat Impacted by a Decrease in Effectiveness for MIS
Alt1	264	1.5 (+0)	5	0.05	3.78	0 (+0)	0.10	198 = 75%
Alt2	0	1.5 (+0)	4	0	3.66	0 (+0)	0	178 = 67%
Alt3	0	1.5 (+0)	5	0	3.66	0 (+0)	0	177 = 67%
Alt4	0	1.5 (+0)	22	0	3.66	0 (+0)	0	160 = 61%
Alt5	0	1.5 (+0)	21	0	3.66	0 (+0)	0	170 = 64%

Table 3- 197. Acres of ZOI by Alternative for Streamside Riparian Habitat

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
203 ac	182 ac	182 ac	182 ac	191 ac

Relationship of Riparian Habitat to MIS

Yellow Warbler

The MIS chosen for this habitat type is the yellow warbler. This species is usually found in riparian deciduous habitats in summer (cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland) (CDFG 2005). Yellow warbler is dependent on both meadow and non-meadow riparian habitat in the Sierra Nevada (Siegel and DeSante 1999).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trend

As determined in the MIS Report for Travel Management (Strand and Sanchez 2010), current motorized travel on the SNF is affecting up to 198 acres of riparian habitat or 1 percent of the acres available within the Sierra Nevada bioregion. Affected acres were derived by summarizing the acres of habitat impacted by existing and added roads, motorized trails and Open Areas. As reasoned in the MIS Report, acres of habitat that are only occasionally traversed by cross-country travel (i.e. no unauthorized routes exist upon them) were not included in the calculation of affected acres. Acres of habitat impacted by roads and motorized trails were derived by placing a ¼ mile buffer along all roads and motorized trails that are open either year-round or seasonally. Roads and motorized trails that are closed year-round were not included in the calculation of affected acres, as reasoned in the MIS Report. A ¼ mile buffer is conservative and likely overestimates the percent of habitat affected. Therefore, it is likely that less than 1 percent of the habitat within the Sierra Nevada bioregion has likely been affected by motorized travel on the SNF. As such, motorized travel on the SNF has not likely affected habitat at a bioregional level, nor has it likely affected the distribution of the yellow warbler across the bioregion.

The alternatives would continue to directly, indirectly, and cumulatively affect up to 160 acres of streamside riparian habitat (lowest) under Alternative 4, and 198 acres (highest) under the No Action alternative. As explained above, the acres affected would likely be less. The Travel Management Plan would **not** result in a change of: (1) habitat acres; (2) canopy cover class; or (3) CWHR size class. However, effectiveness of the habitat would be impacted due to: (1) human disturbance, (2) edge effects, and (3) habitat avoidance and abandonment. Nevertheless, because the acres affected would be less than 1 percent of the total Sierra Nevada-wide acreage, none of the alternatives would likely affect habitat at the bioregional level, nor would they likely affect the distribution of the yellow warbler across the Sierra Nevada bioregion.

Cavity-dependent Species – Affected Environment

The pallid bat and hairy woodpecker will be addressed under this section. The hairy woodpecker tends to utilize snags in green (non-burned) forest snag habitat. The pallid bat is a generalist, and as such, utilizes snags in green forest as well. The Townsend's big-eared bat occasionally utilizes snags but primarily uses caves and mines for roosting and streamside riparian habitat for foraging. It is assumed the use of snags is insignificant, thus Townsend's big-eared bat is addressed solely under riparian habitat (provided above).

Other cavity dependent species utilize snags in burned forests, but these species will not be addressed because such habitat does not currently exist on the SNF.

Bat surveys were conducted on the High Sierra Ranger District in June 2006 between the elevations of 5300 to 6500 feet. In the survey results there were three different categories identified; expected to occur, netting surveys and acoustic surveys. The Pallid bat was inferred in one particular area but the other two species were not found or heard but were expected to occur.

The sample time was very narrow and may not accurately represent what it actually is in the area. These surveys are conducted in a small portion of the analysis areas of Dinkey-Kings and Tamarack-Dinkey.

Pallid bat – Affected Environment

Pallid bats are found in a variety of habitats below 10,000 feet elevation throughout California. In the SNF, they can be associated with oak woodlands, ponderosa pine, mixed conifer, rock crevices and giant sequoia habitats. Tree roosting has been documented in large conifer snags (e.g. ponderosa pine) inside basal hollows of redwoods and giant sequoias and bole activities in oaks (Sherwin 1998). The pallid bat tends to be a roosting habitat generalist that utilizes many different natural and manmade structures (USDA-FS 2001, Ch. 3 part 4.4, page 55). Pallid bats commonly roost under bridges at night, but can also use caves and mines. Day roosts are more varied and include rock outcrops, tree hollows, buildings, bridges, caves and mines. Roost temperatures are important and must be below 104 degrees Fahrenheit (40 degrees Celsius). Foraging habitat requirements appear to be more restrictive. The pallid bat forages close to the ground, often crawling across the ground, preying on large, ground dwelling arthropods such as beetles, scorpions and Jerusalem crickets. Large moths and grasshoppers are consumed to a lesser degree. Pallid bats appear to be more prevalent within edges, open stands, particularly hardwoods and Open Areas without trees (USDA-FS 2001, Ch. 3 part 4.4, page 55). Additional information can be found in the BE/BA (Sorini-Wilson 2010).

Pallid bat – Environmental Consequences

The following indicator was chosen to provide a relative measure of the direct and indirect effects to the Pallid bat. Although thresholds for these indicators have not been established, they provide general measures for comparing the effects of the project alternatives.

Miles within Green snag habitat

Number of Open Areas in green snag habitat

Direct and Indirect Effects

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Under the No Action alternative, 298,507 acres of green forest snag habitat would remain open for motorized cross-country travel. However, less than 232,134 acres are likely impacted by motorized cross-country travel since a portion of the habitat is likely too dense for cross-country travel to occur off roads and motorized trails. Occasional cross-country travel through habitat types on the SNF would not generate lasting impacts upon the habitats, nor would wildlife likely avoid using areas that are only occasionally accessed by motor vehicles. However, where cross-country travel occurs in the same vicinity regularly, unauthorized routes and Open Areas are generated and impacts upon habitat and wildlife use of habitat occurs. Under this alternative, cross-country travel would not be prohibited. It is assumed that the proliferation of unauthorized routes and Open Areas would continue and the effects would be similar to those discussed under adding roads, motorized trails and Open Areas to the NFTS. There would be continued use of about 227 miles of unauthorized routes and 144 acres of unauthorized Open Areas in green forest snag habitat within the project area under this alternative.

While cross-country travel does not have significant effect upon use of green forest snag habitat, unauthorized routes and Open Areas associated with cross-country travel do. Open Areas and roads and motorized trails that are in or less than ¼ mile from the habitat likely increase: (1)

roosting and maternal sites disturbance; and/or (2) habitat avoidance. The period of greatest sensitivity occurs when bats are in their winter hibernaculum or maternal colonies. Disturbance during hibernation depletes valuable reserves. Disturbance in maternal roosts may disrupt parental attentiveness and feeding patterns; thereby increasing the chance that young may become stressed and/or predated upon.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails or Open Areas are proposed for addition to the NFTS; therefore, there will be no direct or indirect effects to the species or the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the current NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effects on Pallid bat within the zone of influence and associated habitat. Therefore, there would be no direct and indirect effects to Pallid bat.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to NFTS roads and motorized trails. It would limit the proliferation of unauthorized routes and allow habitat to recover where degradation may be occurring. This would affect green forest snag habitat by prohibiting vehicular use on all unauthorized routes within the habitat except for about 21 out of the 263 currently existing miles.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and 6 acres of Open Areas are proposed for addition to the NFTS. Of the 44 miles of roads and motorized trails added, 21 miles would be added to green forest snag habitat. None of the Open Areas to be added are within the habitat.

The added NFTS roads and motorized trails and Open Areas would eliminate potential snag roosts within 300 feet of the added roads and motorized trails since hazard trees would be removed along them. Roads and motorized trails added to non-forested habitats may cause noise disturbance to the bat and decrease habitat effectiveness.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Changes to the season of use and open and closed status of roads and motorized trails within green forest snag habitat are not expected to have any detectable impact on the Pallid bat. Regardless of season of use or open and closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, habitat would still be removed within a 300-foot corridor of NFTS roads and motorized trails. Year-round and seasonal closure of roads and motorized trails within non-forested habitats would benefit the bat since it would minimize disturbance to the bat and increase habitat effectiveness.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: This alternative would prevent disturbance to the species within this group by prohibiting cross-country travel. In the long term (20 years), species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel, especially where unauthorized routes no longer receive motorized traffic. The potential impacts discussed under Alternative 1 from cross-country travel would not occur.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails or Open Areas are proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the Pallid bat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS. Effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes. This would reduce the risk of direct and indirect effects, which is a beneficial effect to Pallid bats over the short and long term. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of NFTS roads and motorized trails and 37 acres of 11 Open Areas are proposed for addition to the NFTS. Of the 51 miles of roads and motorized trails added, 27 miles would be added to green forest snag habitat. Of the 37 acres of Open Areas added, 13 acres are within the habitat. There would be snag habitat lost because hazard trees would be removed within 300 feet of added roads, motorized trails and Open Areas. Roads and motorized trails added to non-forested habitats may cause noise disturbance to the bat and decrease habitat effectiveness.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Changes to the season of use and open and closed status to roads and motorized trails within green forest snag habitat are not expected to have any detectable impact upon the bat. Regardless of season of use or open and closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, habitat would still be removed within a 300-foot corridor of NFTS roads and motorized trails. Year-round and seasonal closure of roads and motorized trails within non-forested habitats would benefit the bat since it would minimize disturbance to the bat and increase habitat effectiveness.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibited cross-country travel would limit the proliferation of unauthorized routes near Pallid bat habitat. This would reduce the risk of direct and indirect effects, which is a beneficial effect to Pallid bat habitat over the short and long term. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Eighty-five miles (85) of roads and motorized trails and 105 acres of Open Areas are proposed to be added to the NFTS, under this alternative. Of the 85 miles of roads and motorized trails added, 42 miles would be added to green forest snag habitat. Of the 105 acres of Open Areas added, 52 acres would be within this habitat. The largest amount of habitat would be affected because the highest amount of roads, motorized trails and Open Areas would be added. Snag habitat would be reduced because hazard trees would be removed within 300 feet of added roads and motorized trails and Open Areas. Roads and motorized trails added to non-forested habitats may cause noise disturbance to the bat and decrease habitat effectiveness.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to

wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Changes to the season of use and open and closed status to roads and motorized trails within green forest snag habitat are not expected to have any detectable impact upon the Pallid bat. Regardless of season of use or open and closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, habitat would still be removed within a 300-foot corridor of NFTS roads and motorized trails. Year-round and seasonal closure of roads and motorized trails within non-forested habitats would benefit the bat since it would minimize disturbance to the bat and increase habitat effectiveness.

Cumulative Effects

Wildfires in shrubland, montane hardwood, streamside riparian, early seral coniferous forest habitat, and green forest snag habitat pose cumulative effects upon the bat. Refer to the cumulative effects section for these habitat types for the degree of impact.

Timber management and fuels reduction activities that occur in shrubland, montane hardwood, streamside riparian, and coniferous forest habitats may generate noise disturbance upon the bat. (Refer to the cumulative effects section for these habitats for the degree of impact). Those that occur in green forest snag habitat may remove snag roosts, but this is not believed to be a significant impact upon the bat since it is a generalist and utilized many different types of roosts.

Green Forest Snag Habitat – Affected Environment

Habitat for snag associated species (cavity nesting birds and bats) is considered forest vegetation types with snags larger than 15 inches in diameter. The entire analysis area contains about 417,307 acres of coniferous forest stands. Of these, 40,364 acres are classified as early seral coniferous forest habitat. While there are likely some medium to large diameter trees within this habitat, the majority of trees are less than 15 inches in diameter at breast height (dbh). Therefore, it is assumed that the amount of suitable snags greater than 14.9 inches dbh provided by this habitat is insignificant. Thus, these acres will not be included in the computation of snags in green forest habitat. For the purpose of this report, it will be assumed that all mid seral coniferous forest stands provide snags in green forest habitat (even though it includes trees would be as small as 11 inches dbh, as well as those as large as 23.9 inches dbh). Adding up all acres of mid and late seral coniferous forest stands; the analysis area provides about 376,943 acres of green forest snag habitat. (**Note:** This is a conservative approach and likely overestimates that amount of green forest snag habitat available). Mid seral stands include trees as small as 11 inches dbh. Therefore, some stands may not provide appropriate-sized snags. Furthermore, some mid seral and late seral closed canopy stands include stands with canopy covers greater than 60 percent, and may be too dense for utilization by the MIS. Adding up all acres of mid seral and late seral open and closed canopy coniferous forest stands, the analysis area provides about 376,943 acres of green forest snag habitat. The number of snags per acre was estimated by plot data and computer simulation for two watersheds (encompassing about 131,500 acres on the High Sierra Ranger District) as part of the Kings River Project. Assuming that the numbers found for the Kings River Project are representative of the entire forest, there are currently 3.1 snags per acre within the analysis area.

About 298,507 of the available habitat acres are currently open to cross-country motorized travel. About 263 miles of unauthorized routes (encompassing 27,043 zone of influence (ZOI) acres) were created by users within this habitat. About 36 of these miles were created in areas where motorized cross-country travel is currently prohibited (See Figure 1-3 for a map of these areas). About 1,550 miles of NFTS roads and motorized trails, private roads, and other public roads

(state, county, other federal) (encompassing 126,144 ZOI acres) exist in green forest snag habitat within the analysis area. Including the roads, motorized trails, and unauthorized routes, the habitat has a route density of 3.08 mi./sq.mi. About 13 acres of managed Open Areas exist within the habitat. Furthermore, about 172 acres of unauthorized Open Areas exist. About 28 acres of unauthorized Open Areas exist in prohibited areas.

Snags and snag replacements (hazard trees) are generally removed within 300 feet of NFTS roads and motorized trails and managed Open Areas. While they are removed along maintenance level 1 and 2 roads and motorized trails and roads and motorized trails closed year-round less often (since such roads and motorized trails are typically not accessible to logging equipment without pre-maintenance work), such roads and motorized trails may be treated if there is a hazard sale in the vicinity and there are a high number of hazards along them. Therefore, for the purpose of this analysis, it will be assumed that all NFTS roads and motorized trails may have hazard sale treatments along them. As such, about 126,157 acres or 34 percent of the habitat is foreseeable lost through hazard tree removal along NFTS roads and motorized trails and managed Open Areas. (**Note:** This is a conservative approach and likely overestimates the amount of habitat lost through hazard tree removal).

Snags and snag replacements are not removed along unauthorized routes and Open Areas; therefore, unauthorized routes and Open Areas do not have associated loss of habitat. Nevertheless, they do have a negative effect upon MIS use of the habitat within their ZOI. Therefore, in addition to a foreseeable 34 percent loss of habitat, there is a decrease in effectiveness on about 27,215 acres or 7 percent of the habitat due to current motorized travel.

Green Forest Snag Habitat – Environmental Consequences

Direct and Indirect Effects

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the habitat. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Acres of habitat available
- Acres of habitat open for cross-country motorized use
- Miles of unauthorized routes within the habitat, and acres of habitat encompassed by a ¼ mile zone of influence (ZOI)
- Miles of NFTS, private, other public roads and motorized trails within the habitat, and acres of habitat encompassed by a ¼ mile ZOI
- Total density (mi/sq mi) of roads and motorized trails (authorized and unauthorized) that could continue to have use within the habitat
- Acres of Open Areas (FS managed and unauthorized) within the habitat

ALTERNATIVE 1 – NO ACTION

Effects Due to Continued Cross-country Motor Vehicle Travel: Under the No Action alternative, 298,507 acres of green forest snag habitat would remain open for motorized cross-country travel. However, not all of these acres are likely utilized as such. The 66,373 acres of late seral closed canopy coniferous forest habitat that is open for motorized cross-country use is likely too dense for vehicular travel off routes. Furthermore, some of the mid seral stands are likely too dense. Therefore, less than 232,134 acres of green forest snag habitat are likely impacted by motorized cross-country travel. Occasional cross-country travel through habitat

types on the SNF would not generate lasting impacts upon the habitats, nor would MIS likely avoid using areas that are only occasionally accessed by motor vehicles. However, where cross-country travel occurs in the same vicinity regularly, unauthorized routes and Open Areas are generated and impacts upon habitat and MIS use of habitat occurs. Under this alternative, cross-country travel would not be prohibited. It is assumed that the proliferation of unauthorized routes and Open Areas would continue and the effects would be similar to those discussed under adding roads and motorized trails and Open Areas to the NFTS. There would be continued use of about 227 miles of unauthorized routes and 144 acres of unauthorized Open Areas in green forest snag habitat within the project area under this alternative.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or Open Areas proposed for addition to the NFTS under this alternative; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the current season of use on NFTS roads. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effect upon green forest snag habitat effectiveness.

ALTERNATIVE 2 – PROPOSED ACTION

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and 6 acres of Open Areas are proposed for addition to the NFTS. Of the 44 miles of roads and motorized trails added, 21 miles would be added to green forest snag habitat. None of the Open Areas to be added are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the season of use and open and closed status are not expected to have any detectable impact on snag-associated species or their habitat. Regardless of season of use or open and closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, habitat would be removed within a 300-foot corridor of NFTS roads and motorized trails, as explained above.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails or use areas are proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there would be no changes to the NFTS. Effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of roads and motorized trails and 37 acres of Open Areas are proposed for addition to the NFTS. Of the 51 miles of roads and motorized trails added, 27 miles would be added to green forest snag habitat. Of the 37 acres of Open Areas added, 13 acres are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the season of use and open and closed status are not expected to have any detectable impact on snag-associated species or their habitat. Regardless of season of use or open and closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, habitat would be removed within a 300-foot corridor of NFTS roads and motorized trails, as explained above.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described under Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 85 miles of roads and motorized trails and 105 acres of Open Areas are proposed for addition to the NFTS. Of the 85 miles of roads and motorized trails added, 42 miles would be added to green forest snag habitat. Of the 105 acres of Open Areas added, 52 acres are within the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the season of use and open and closed status are not expected to have any detectable impact on snag-associated species or their habitat. Regardless of season of use or open and closed status, hazard trees (thereby green snags) are removed along NFTS roads and motorized trails for safety purposes. Therefore, habitat would be removed within a 300-foot corridor of NFTS roads and motorized trails, as explained above.

Green Forest Snag Habitat - Cumulative Effects

Cavity nesting species are typically more secure from predation and recreational disturbance is not known to be a limiting factor for these species as it is for other forest birds (Gaines et al.

2003). Motorized route factors that likely to affect cavity-associated species are edge effects and the reduction of snags and down logs. The higher the road and motorized trail density, the greater the amount of habitat taken out of effective MIS use. When density exceeds a certain point, the habitat does not provide any place for undisturbed reproduction, foraging, or resting to occur. If density remains too high, habitat is likely avoided. Species population can be reduced as a result. Existing motorized travel has created a route density of 3.08 mi./sq.mi within green forest snag habitat. It has likely contributed a loss of up to 34 percent of the habitat within the analysis area and has likely impacted an additional 7 percent by decreasing its effectiveness for MIS. A comparison of route densities and percent habitat impacted is provided in the table below.

Other activities have likely contributed cumulative effects upon the habitat. There are currently about 100 developed campgrounds and day use sites; other developed sites such as boat launches, and trailheads; and recreational special use sites such as pack stations, resorts, camps, and summer home tracts that exist within the analysis area. Together, they encompass roughly 3,242 acres. Furthermore, powerlines, communication systems, water systems, the Sugar Pine Railroad, and other special use lands encompass about 1,812 acres within the analysis area. Snags are removed from these recreational and administrative areas as well. Together, they have likely removed 5,054 acres or 1 percent of the snag habitat from the analysis area. There are also about 489 miles of non-motorized trails within the analysis area. While snags are removed along such trails, habitat is not reduced a significant amount at any one time because they must be accessed by foot and treated by hand.

About 28,517 acres of mid and late seral coniferous forest stands have been impacted by timber management activities within the analysis area. They have removed snags and snag replacements within the habitat. Nevertheless, S&Gs require a certain number of snags per acre be left behind to ensure the sustainability of green forest snag habitat. Therefore, while the quality may have been degraded, habitat was not likely reduced. Prior to 2004, the forest implemented standards and guidelines (S&Gs) from the Sierra National Forest Land and Resource Management Plan (LRMP) (1991) which called for maintaining an average of 1.5 snags per acre in sizes 15-24 inches dbh and an average of 0.5 snags per acre in sizes 25 inches dbh or greater. All countable snags had to be 20 feet or greater in height (S&G #64, p. 4-16). Additionally, a sufficient number of live trees had to be left in appropriate sizes to serve as replacement snags. The Sierra Nevada Forest Plan Amendment (SNFPA) (2004), modified the LRMP with the followings guidelines: (1) in westside mixed conifer and ponderosa pine types, Forests should maintain 4 of the largest snags per acre, (2) in red fir forest type, they should maintain 6 of the largest snags per acre, (3) in eastside pine and mixed conifer forest types, they should maintain 3 of the largest snags per acre, and (4) in westside hardwood ecosystems, they should maintain 4 of the largest snags (hardwood or conifer) per acre, or if standing live hardwood trees lack dead branches, they should maintain 6 of the largest snags per acre (S&G #11, p. 51).

About 8,319 acres of mid and late seral coniferous forest stands have/will be impacted by prescribed burns within the analysis area. While burns include design measures to protect the required number of snags per acre, many existing snags are consumed. Nevertheless, snags lost are quickly replaced since burned trees are more susceptible to diseases. Fuel models run for the Kings River Project analysis revealed that snags were anticipated to increase after proposed burn treatments by (Parks and Rojas 2006):

- + 0.7 snags per acre that are between 15 and 24 inches
- + 0 snags per acre that are between 24 and 35 inches
- 0.1 snags per acre that are greater than 35 inches

The same results are assumed for the prescribed burns implemented within the analysis area. Therefore, it is anticipated that the prescribed burns have/will improve the habitat by increasing the number of snags and decreasing the habitat's susceptibility to wildfire.

About 7,940 acres or 2 percent of mid and late seral coniferous forest habitat has been burned in wildfires within the analysis area. Green forest snag habitat has been lost as a result. Viewing historical fires records of the High Sierra Ranger District, it is foreseeable that about 1,866 additional acres would burn on the district in the foreseeable future. The same acreage is assumed for the Bass Lake RD, as well. Therefore, it is reasonable to assume that additional habitat will be lost to wildfires.

Table 3- 198 below summarizes the differences that would occur within green forest snag habitat under each alternative.

Table 3- 198. Green Forest Snag Habitat Indicators by Alternative

	Acres Open to Motorized Cross-country Travel	Miles of NFTS and other Private/Public Roads and Motorized Trails (added miles included in total above)	Miles of NFTS Roads and Motorized Trails Closed Year-round*	Miles of Unauthorized Routes that Can Receive Motorized Travel	Route Density (mi./sq. mi.)	Acres of Managed Open Areas (added Open Areas included in total above)	Acres of Unauthorized Open Areas that Can Receive Motorized Travel	Acres and Percent Habitat Lost	Acres and Percent Habitat Impacted by a Decrease in Effectiveness for MIS
Alt1	298,507	1,550 (0)	0	227	3.02	13 (0)	144	126,157= 34%	23,486 = 6%
Alt2	0	1,571 (21)	0	0	2.67	13 (0)	0	128,393= 34%	0
Alt3	0	1,550 (0)	0	0	2.63	13 (0)	0	126,157= 34%	0
Alt4	0	1,577 (27)	0	0	2.68	26 (13)	0	128,881= 34%	0
Alt5	0	1,592 (42)	0	0	2.70	65 (52)	0	130,623= 35%	0

*This column data is 0 miles because if there is a snag there is an assumption it would be removed for safety purposes if route was accessed for administrative use. Miles of NFTS roads and motorized trails closed year-round are not considered as an indicator for this habitat as it is for other habitats. If roads and motorized trails were closed year-round in other habitats, it was assumed that impacts would not result since there would be little human disturbance or edge effects. Therefore, roads and motorized trails closed year-round were not considered in the calculation of affected acres and needed to be separated out. Thus, they were displayed in the indicator tables for the other habitats. However, impacts would result along **all** roads and motorized trails in green forest snag habitat because hazard trees (thereby snag habitat) would be removed regardless of the open or closed status of a route.

Relationship of Green Forest Snag Habitat to MIS

Hairy Woodpecker

The MIS chosen for this habitat type is the hairy woodpecker. Medium (diameter breast height between 15 to 30 inches) and large (diameter breast height greater than 30 inches) snags are most important. The hairy woodpecker uses stands of large, mature trees and snags of sparse to intermediate density; cover is also provided by tree cavities (CDFG 2005). Mature timber and dead snags or trees of moderate to large size are apparently more important than tree species (Siegel and DeSante 1999).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trend

Assuming that the numbers found within the Kings River Project boundary are representative of the entire forest, there are currently 3.1 snags per acre within the analysis area. Broken into specific forest types, there are 2.3 snags per acre in ponderosa pine, 3.5 snags per acre in mixed conifer, and 4.0 snags per acre in red fir. This is within the range (1.4 to 8.3 snags per acre) identified for the Sierra Nevada bioregion. Motorized travel does not affect the number of snags per acre that are found within green forest snag habitat, but rather impacts the amount of green forest snag habitat that is available and the degree of its effectiveness for MIS. Therefore, to determine how motorized travel on the SNF has/will impact the bioregional trends for this habitat and associated MIS, acres of green forest snag habitat have to be determined for the bioregion.

For the purpose of this analysis, the bioregional-wide acres of green forest snag habitat were assumed to be the sum of the bioregional-wide acres of mid seral, late seral open canopy, and late seral closed canopy coniferous forest habitats. (**Note:** This is how acres of green forest snag habitat were computed for the analysis area). Under this assumption, there are 3,835,000 acres of green forest snag habitat within the Sierra Nevada bioregion. As determined in the MIS Report for Travel Management (Strand and Sanchez 2010), current motorized travel on the SNF has led to a loss of about 126,157 acres or 3 percent of green forest snag habitat within the Sierra Nevada bioregion, and has impacted up to an additional 23,486 or 1 percent by decreasing its effectiveness for MIS. Acres lost were derived by summarizing the acres of habitat impacted by existing and added roads, motorized trails and Open Areas. Acres of habitat lost along NFTS roads and motorized trails were derived by placing a 300 foot buffer along all NFTS roads and motorized trails. This is the distance that hazard trees are removed along roads and motorized trails. Acres of habitat with decreased effectiveness were derived by summing the acres of unauthorized roads, motorized trails and Open Areas. Acres of unauthorized roads and motorized trails were determined by placing a ¼ mile buffer along all unauthorized roads and motorized trails. The ¼ mile buffer is conservative and likely overestimates the percent of habitat with decreased effectiveness. Therefore, it is likely that less than 1 percent of the bioregional habitat has been affected with decreased effectiveness due to motorized travel on the SNF. As reasoned in the MIS Report, acres of habitat that are only occasionally traversed by cross-country travel (i.e. no unauthorized routes exist upon them) were not included in the calculation of lost or adversely affected acres. Considering the amount of habitat lost and adversely affected, current motorized travel on the SNF has likely affected less than 153,372 or 4 percent of the bioregional-wide habitat. Therefore, motorized travel on the SNF has not likely affected habitat at a bioregional level, nor has it likely affected the distribution of the hairy woodpecker across the bioregion.

The Sierra National Forest Motorized Travel Management Project will directly, indirectly, and cumulatively affect between 126,157 acres of green forest snag habitat (lowest) under Alternative

3, and 149,643 acres (highest) under the No Action alternative. Because the acres affected range from only 3 to 4 percent of the total Sierra Nevada-wide acreage, none of the alternatives would likely affect habitat at the bioregional level, nor would they likely affect the distribution of hairy woodpecker across the Sierra Nevada bioregion.

MIS Habitats and Associated Species not Covered under the Wildlife Categories Listed Above

Early and Mid Seral Coniferous Forest Habitat– Affected Environment

Early and mid seral coniferous forest on the SNF is composed of ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine habitat in the Sierra Nevada. Early seral coniferous forest habitat is comprised primarily of seedlings (less than 1 inch dbh), saplings (1 to 5.9 inches dbh), and pole-sized trees (6 to 10.9 inches dbh). Mid seral coniferous forest habitat is comprised primarily of small-sized trees (11 to 23.9 inches dbh). The entire analysis area contains about 40,364 acres of early seral coniferous forest habitat and 308,472 acres of mid seral coniferous forest habitat. Acres of these habitats that are currently open to cross-country motorized travel are 33,284 and 238,124, respectively. Miles of unauthorized routes in these habitats are 57 and 226, respectively. They encompass about 33,873 and 228,864 zone of influence (ZOI) acres. About 8 miles of the unauthorized routes in early seral and 34 miles of the unauthorized routes in mid seral coniferous forest habitats exist in areas that are currently prohibited to motorized cross-country travel. (See Figure 1-3 for a map of those areas). Miles of roads and motorized trails within the two habitats are 241 and 1,296, respectively. They encompass about 16,364 and 95,360 ZOI acres. Together, the unauthorized routes, roads, and motorized trails form route densities of 4.73 mi./sq.mi. in early seral coniferous forest habitat and 3.16 mi./sq.mi. in mid seral coniferous forest habitat. There are 40 and 12 acres of managed Open Areas in early and mid seral coniferous forest habitats, respectively. As well, there are 23 and 154 acres of unauthorized Open Areas in the two habitats, respectively. Of the unauthorized Open Areas, about 3.5 and 26 acres exist in prohibited areas, respectively. Total acres impacted within these two habitats are about 50,300 and 324,390 acres, respectively. (**Note:** These totals are about 20 and 5 percent more than the acres available for these habitats. This is due, in majority, to overlapping ZOIs. Acres of ZOI were computed separately for unauthorized routes and roads/motorized trails. Where ZOIs overlapped, acres were double counted. While this presents a flaw in the methodology used, results are considered representative). About 26 miles of roads and motorized trails (encompassing 7,453 ZOI acres) are closed year-round (prohibited) in early seral habitat, and about 126 miles (encompassing 43,861 ZOI acres) are closed year-round (prohibited) in mid seral habitat. Considering this, the acres of habitat taken out of effective MIS use are closer to 42,847 and 280,529 acres, respectively. This means that about 100 percent of the early seral and 91 percent of the mid seral coniferous forest habitats have been impacted by motorized travel.

Early and Mid Seral Coniferous Forest Habitat – Environmental Consequences

Direct and Indirect Effects

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the habitat. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Acres of habitat available

- Acres of habitat open for cross-country motorized use
- Miles of unauthorized routes within the habitat, and acres of habitat encompassed by a ¼ mile zone of influence (ZOI)
- Miles of NFTS, private, other public roads and motorized trails within the habitat, and acres of habitat encompassed by a ¼ mile ZOI
- Total density (mi/sq mi) roads and motorized trails and unauthorized routes that could continue to receive use within the habitat
- Acres of Open Areas (FS managed and unauthorized) within the habitat

ALTERNATIVE 1 – NO ACTION

Effects due to Continued Cross-country Motor Vehicle Travel: Under the No Action alternative, 33,284 acres of early seral coniferous forest habitat and 238,124 acres of mid seral coniferous forest habitat would remain open for motorized cross-country travel. Nevertheless, cross-country travel does not likely occur on all of these acres. Dense mid seral stands would likely be difficult to traverse, and cross-country travel in dense early seral habitat would be prohibited since it would likely damage young trees.

Occasional cross-country travel through habitat types on the SNF would not generate lasting impacts upon the habitats, nor would MIS likely avoid using areas that are only occasionally accessed by motor vehicles. However, where cross-country travel occurs in the same vicinity regularly, unauthorized routes and Open Areas are generated and impacts upon habitat and MIS use of habitat occurs. Under this alternative, cross-country travel would not be prohibited. It is assumed that the proliferation of unauthorized routes and Open Areas would continue and the effects would be similar to those discussed under adding roads, motorized trails and Open Areas to the NFTS. This means that respectively, about 49 and 192 miles of unauthorized routes and 19 and 128 acres of unauthorized Open Areas could receive use in early and mid seral coniferous forest habitats under the No Action alternative.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or Open Areas proposed for addition to the NFTS under this alternative; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effect upon early and mid seral coniferous habitat effectiveness.

ALTERNATIVE 2 – PROPOSED ACTION

Effects due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and 6 acres of Open Areas are proposed for addition to the NFTS. Of the 44 miles of roads and motorized trails added, about 8 and 18 miles of would be added to early and mid seral coniferous forest habitats, respectively. Of the 6 acres of Open Areas added, none would be added to early seral, but 3 would be added to mid seral coniferous forest habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to

wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 14 more miles of roads and motorized trails within early seral coniferous forest habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 35 percent. About 78 more miles of roads and motorized trails within mid seral coniferous forest habitat would be closed year-round, increasing the amount of roads and motorized trails closed year-round in the habitat by 38 percent.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private, and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2. The effects described Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails or Open Areas proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads). Under this alternative, there would be no changes to the NFTS. Effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private and other public roads and motorized trails. The effects are the same as described in Alternative 2. The effects described Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of roads and motorized trails and 37 acres of Open Areas are proposed for addition to the NFTS. Of the 51 miles added, about 7 and 24 miles would be added to early and mid seral coniferous forest habitats, respectively. Of the 37 acres of Open Areas added, approximately 3 and 13 acres would be added to early and mid seral habitats, respectively.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 23 more miles of roads and motorized trails within early seral coniferous forest habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 47 percent. About 121 more miles of roads and motorized trails within mid seral coniferous forest habitat would be closed year-round, increasing the amount of roads and motorized trails closed year-round in the habitat by 49 percent.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas, and NFTS, private, and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2. The effects described Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 85 miles of roads and motorized trails and 105 acres of Open Areas are proposed for addition to the NFTS. Of the 85 miles added, about 11 and 36 miles would be added to early and mid seral coniferous forest habitats, respectively. Of the 105 acres of Open Areas added, about 6 and 51 acres would be added to early and mid seral coniferous forest habitats, respectively.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 7 more miles of roads and motorized trails within early seral coniferous forest habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 21 percent. About 57 more miles of roads and motorized trails within mid seral coniferous forest habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 31 percent.

Early and Mid Seral Coniferous Forest Habitat - Cumulative Effects

As discussed above, roads, motorized trails and Open Areas within ¼ mile of the habitat likely increase: (1) nesting, resting and foraging disturbance; (2) nest predation; and/or (3) habitat avoidance. Those impacts are most significant during the reproductive seasons and may reduce reproductive success. Reproductive season for the mountain quail begins in late March and ends in late August. The periods of greatest sensitivity occurs during nest building, and incubation when the individual is more likely to abandon the site (Gotmark 1992 in Knight and Gutzwiller 1995). Another period of sensitivity is the nestling/fledgling period when parental attentiveness may be disturbed; thereby, disrupting feeding patterns and increasing the chance that young may become stressed and/or predated upon.

The higher the road and motorized route density, the greater the amount of habitat taken out of effective MIS use. When density exceeds a certain point, the habitat does not provide any place for undisturbed reproduction, foraging, or resting to occur. If density remains too high, habitat is likely avoided. Species population can be reduced as a result. Existing motorized travel has created a route density of 4.73 mi./sq.mi in early seral coniferous forest habitat and has likely impacted as much as 100 percent of the habitat by decreasing its effectiveness for MIS. It has created a route density of 3.16 mi./sq.mi in mid seral coniferous forest habitat and has likely impacted as much as a 91 percent of this habitat. A comparison of route densities and percent habitat impacted is provided in the table below.

There are 28 active cattle allotments, encompassing about 743,247 acres, and permitting 17,000 AUMs within the analysis area. Some of the cattle allotments encompass early and mid seral coniferous forest habitat. The primary impact of cattle is upon the mountain quail, itself, and not

the habitat [i.e. Nests can be trampled by cattle (CDFG 200 *In*: USDA-FS 2008); and quail can drown in livestock watering devices that do not have escape ramps (Ibid)]. However, cattle can impact early seral coniferous forest habitat. They enter young plantations to browse on newly emerging shrubs and young leader growth, and therefore, occasionally trample seedlings. Nevertheless, this impact tends to be insignificant (Helm 2008).

About 53,192 acres within the analysis area have been impacted by timber management activities, with about 14,104 acres (4 percent) and 23,997 acres (1 percent) occurring in early and mid seral coniferous forest habitats, respectively. Furthermore, there are about 50,805 acres of plantations within the analysis area, with about 10,602 (3 percent) and 16,587 (1 percent) occurring in early and mid seral coniferous forest habitats respectively. Some double counting of impacted acres likely occurs since both harvesting and planting occurs on the same piece of land over the long run. Nevertheless, the acres of impacted habitat are thought to be a fair representation. One of the five causes of mountain quail mortality listed by CDFG (1995 *In* USDA-FS 2008) was nest loss due to logging activities. It is assumed that plantation activities cause equal disturbance. Timber management and plantation treatments cause other impacts, as well. Immediately after treatment, the habitats are not as effective for MIS because understory cover and food sources (grass seed and buds/flowers/berries of shrubs) are significantly reduced or lacking altogether. Nevertheless, grasses and shrubs typically recover in less than a year. Time can be greater, however, depending upon the sprouting nature of the shrub species and the treatment used. Chemical treatments can delay shrub recovery for around 5 years. Despite the temporary reduction in cover and food, the overall effect of plantation and timber management activities is to improve the quality of early and mid seral habitats. Recovered shrubs in the understory are rejuvenated, and treatments (such as thinning) improve the health, vigor, growth, and resistance of trees in the overstory.

About 693 and 6,627 acres of prescribed burns, respectively, have/will occur in early and mid seral coniferous forest habitats within the analysis area. Prescribed burns have/will likely benefit the habitats by removing excess fuel buildup and making the habitat less susceptible to wildfires. While the understory shrub component is decreased immediately after prescribed burn treatments, shrubs typically sprout back within a year and are rejuvenated.

About 693 and 5,809 acres of wildfires, respectively, have occurred in early and mid seral coniferous forest habitats within the analysis area. Viewing historical fires records of the High Sierra Ranger District, it is foreseeable that about 1,866 additional acres would burn on the district in the foreseeable future. The same acreage is assumed for the Bass Lake RD, as well. While many burned acres are replanted and provide habitat again, it is likely that a significant portion are converted to shrubland habitat. Some coniferous forest habitats do not re-establish, either because the burned sites are no longer conducive to coniferous forest regeneration or budget constraints do not allow every acre to be replanted. Under the current funding trend (last 10 years), only about 10 percent of burned coniferous forest habitats have been replanted (Rojas 2008). Nevertheless, it is anticipated that only around 3 percent of early seral and 2 percent of mid seral habitat within the analysis area have/will be impacted by wildfires.

Table 3- 199 below summarizes the differences that would occur within early and mid seral coniferous forest habitats under each alternative.

Table 3- 199. Indicators per Alternative for Early and Mid Seral Coniferous Forest Habitats

	Acres Open to Motorized Cross-country Travel	Miles of NFTS and other Private/Public Roads and Motorized Trails (added miles included in total above)	Miles of NFTS Roads and Motorized Trails Closed Year-round*	Miles of Unauthorized Routes that Can Receive Motorized Travel	Route Density (mi./sq. mi.)	Acres of Managed Open Areas (added Open Areas included in total above)	Acres of Unauthorized Open Areas that Can Receive Motorized Travel	Acres and Percent Habitat Impacted by a Decrease in Effectiveness for MIS
Early Seral Coniferous Forest Habitat								
Alt1	33,284	241 (+0)	26	49	4.60	40 (+0)	19	40,642 =100%
Alt2	0	249 (+8)	40	0	3.95	40 (+0)	0	24,992 = 62%
Alt3	0	241 (+0)	26	0	3.83	40 (+0)	0	26,460 = 66%
Alt4	0	248 (+7)	49	0	3.94	43 (+3)	0	22,767 = 56%
Alt5	0	252 (+11)	33	0	4.00	46 (+6)	0	28,146 = 70%
Mid Seral Coniferous Forest Habitat								
Alt1	238,124	1,296 (+0)	126	192	3.09	12 (+0)	128	265,455 =86%
Alt2	0	1,314 (+18)	204	0	2.73	15 (+3)	0	163,864 =53%
Alt3	0	1,296 (+0)	126	0	2.69	12 (+0)	0	185,015 =60%
Alt4	0	1,320 (+24)	247	0	2.74	25 (+13)	0	152,699 =50%
Alt5	0	1,332 (+36)	183	0	2.76	63 (+51)	0	184,593 =60%

Relationship of Early and Mid Seral Coniferous Forest Habitat to MIS

Mountain Quail

The MIS chosen for this habitat type is the mountain quail. The mountain quail is found particularly on steep slopes, in open, brushy stands of conifer and deciduous forest and woodland, and chaparral; it may gather at water sources in the summer, and broods are seldom found more than 0.8 km (0.5 mi) from water (CDFG 2005).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trend

As determined in the MIS Report for Travel Management (Strand and Sanchez 2010), current motorized travel on the SNF is affecting up to 42,847 acres (8 percent) and 280,529 acres (10 percent) of early and mid seral coniferous forest habitat within the Sierra Nevada bioregion, respectively. The result is reduced habitat effectiveness for mountain quail through disturbance, edge effects, avoidance, and abandonment of habitat. As previously discussed, affected acres were derived by summing the acres of habitat impacted by existing and added roads, motorized trails and Open Areas. As reasoned in the MIS Report, acres of habitat that are only occasionally traversed by cross-country travel (i.e. no unauthorized routes exist upon them) were not included in the calculation of affected acres. Acres of habitat impacted by roads and motorized trails were derived by placing a ¼ mile buffer along all roads and motorized trails that are open year-round. Roads and motorized trails that are closed year-round were not included in the calculation of affected acres for mountain quail, as reasoned in the MIS Report. A ¼ mile buffer is conservative and likely overestimates the percent of habitat affected. Therefore, it is likely that less than 8 percent of early seral and less than 10 percent of mid seral coniferous forest habitats within the Sierra Nevada bioregion have likely been affected by motorized travel on the SNF. An assumption was made in the MIS Report that effects upon MIS habitats that are 5 percent or greater are significant and likely affect habitat and population trends. As such, motorized travel on the SNF may have impacted habitat effectiveness, and may have affected distribution of mountain quail at the bioregional level. However this is not likely the case. While a ¼ mile buffer along roads and motorized trails is a conservative but reasonable zone of influence (ZOI) for many species, it likely overestimates the amount of early and mid seral habitat affected by motorized travel by a considerable amount. Unlike deer or other more visible MIS, mountain quail do not likely need as large of a ZOI in order to ensure adequate cover. Nor do they need as large of a ZOI to protect them from road-side predation. While mountain quail are prone to predation, much of it is upon the young and adults, not the nests, and much of the predation is from accipiters rather than road-side predators. Furthermore, while nest predation can extend up to 600 meters (greater than ¼ mile), narrow routes with no maintained verge do not typically generate substantial edge effects, particularly when surrounded by a tall forest canopy (Noss 2000). Therefore, nest predators are not expected to increase significantly in numbers along the majority of the NFTS roads and motorized trails. Despite the fact that the roads and motorized trails ZOI did not need to be as high as ¼ mile for mountain quail, it was used to maintain consistency between the method the MIS habitats were analyzed

The SNF Travel Management Project would continue to directly, indirectly, and cumulatively affect up to 22,767 acres of early seral coniferous forest habitat (lowest) under Alternative 4, and 40,642 acres (highest) under the No Action Alternative. The acres affected range from 4 to 7 percent of the total Sierra Nevada-wide acreage. The Travel Management Plan would **not** result in a change of: (1) habitat acres; (2) canopy cover class; or (3) CWHR size class within early seral coniferous forest. However, as mentioned above, effectiveness of the habitat would be impacted due to: (1) human disturbance, (2) edge effects (nest parasitism and predation), and (3) habitat avoidance and abandonment. As discussed above, the acres affected are likely less than

stated above since a conservative approach was taken for the calculation of affected acres. Therefore, Alternative 4 would decrease impact of motorized travel at the bioregional level to less than 4 percent. Alternatives 2, 3, and 5 would decrease impact of motorized travel at the bioregional level to less than 5 percent. As such, the action alternatives would likely decrease impact of motorized travel on the SNF to the point that it would no longer have a significant effect upon habitat and distribution of mountain quail at the bioregional level. At less than 7 percent, the No Action alternative may continue to adversely affect habitat effectiveness, and may affect the distribution of mountain quail at the bioregional level, but this is not likely the case, as reasoned above. The majority of effects would occur from existing roads and motorized trails and Open Areas (and under Alternative 1, unauthorized routes that could receive use). Only an insignificant amount (less than 1 percent) would be due to added roads, motorized trails and Open Areas.

The Travel Management Project will directly, indirectly, and cumulatively affect up to 152,699 acres of mid seral coniferous forest habitat (lowest) under Alternative 4, and 265,455 acres (highest) under the No Action Alternative. The acres affected range from 6 percent to 10 percent of the total Sierra Nevada-wide acreage. The Travel Management Plan would **not** result in a change of: (1) habitat acres; (2) canopy cover class; or (3) CWHR size class within mid seral coniferous forest habitat. However, as mentioned above, effectiveness of the habitat would be impacted due to: (1) human disturbance, (2) edge effects (nest parasitism and predation), and (3) habitat avoidance and abandonment. As previously mentioned the acres affected are likely less than stated above since a conservative approach was taken for the calculation of affected acres. Alternative 2 and Alternative 4 would have the least affect (less than 6 percent), followed by Alternatives 3 and 5 (less than 7 percent). The No Action alternative would have the greatest affect (less than 10 percent). Because all of the alternatives may continue to affect greater than 5 percent of the total Sierra Nevada-wide acreage, they may adversely affect the habitat at a bioregional level, and may affect the distribution of mountain quail across the bioregion. However, this is not likely the case as reasoned above. The majority of effects would occur from existing roads, motorized trails and Open Areas (and under Alternative 1, unauthorized routes that could receive use). Only an insignificant amount (less than 1 percent) would be due to added roads, motorized trails and Open Areas.

Shrubland Habitat– Affected Environment

Shrubland habitat on the SNF is comprised of montane chaparral (MCP) and mixed chaparral (MCH), as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG 2005). The entire analysis area contains about 50,713 acres of shrubland habitat. About 46,459 of them are currently open to cross-country motorized travel. About 30 miles of unauthorized routes (encompassing 10,785 ZOI acres) exist within this habitat. About 1.7 of these miles exist in areas where motorized cross-country travel is currently prohibited (See Figure 1-3 for a map of those areas). About 161 miles of NFTS roads and motorized trails, private roads, and other public roads (state, county, other federal) (encompassing 26,287 ZOI acres) exist in shrubland habitat within the analysis area. Including all roads, trails, and unauthorized routes (even those in prohibited areas), the habitat has a route density of 2.42 mi./sq.mi. About 1.5 acres of managed Open Areas exist within the habitat. Furthermore, about 22.0 acres of unauthorized Open Areas exist within the habitat. About 1.7 of these exist in prohibited areas. All in all, about 37,096 acres of shrubland habitat are impacted by roads, trails, unauthorized routes, managed Open Areas, and unauthorized Open Areas. Nevertheless, because about 17 miles of roads and motorized trails (encompassing 4,336 ZOI acres) are closed year-round to motor vehicle traffic (except for necessary administrative use), the acres of shrubland habitat taken out of effective MIS use is closer to 32,760 or 65 percent.

Shrubland Habitat – Environmental Consequences

Direct and Indirect Effects

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the habitat. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Acres of habitat available
- Acres of habitat open for cross-country motorized use
- Miles of unauthorized routes within the habitat, and acres of habitat encompassed by a ¼ mile zone of influence (ZOI)
- Miles of NFTS, private, other public roads and motorized trails within the habitat, and acres of habitat encompassed by a ¼ mile ZOI
- Total density (mi/sq mi) roads and motorized trails and unauthorized routes that could receive use within the habitat
- Acres of Open Areas (FS managed and unauthorized) within the habitat

ALTERNATIVE 1 – NO ACTION

Effects due to Continued Cross-country Motor Vehicle Travel: Under the No Action alternative, 46,459 acres of shrubland habitat would remain open for motorized cross-country travel. Nevertheless, the majority of this habitat on the SNF is mature to decadent, and shrubs are too large and dense to permit much vehicular travel off roads and motorized trails and unauthorized routes). Generally, cross-country travel in shrubland habitat is possible for only about a year after a wildfire, control burn, fuels reduction, or other vegetation management activity. Motorized travel after a fire or other disturbance would impact deer that are browsing on newly emerging shrubs, but would not likely impact the MIS (fox sparrows) because they would not likely be present due to a lack of adequate nesting and cover habitat.

Occasional cross-country travel through habitat types on the SNF would not generate lasting impacts upon the habitats, nor would MIS likely avoid using areas that are only occasionally accessed by motor vehicles. However, where cross-country travel occurs in the same vicinity regularly, unauthorized routes and Open Areas are generated and impacts upon habitat and MIS use of habitat occurs. Under this alternative, cross-country travel would not be prohibited. It is assumed that the proliferation of unauthorized routes and Open Areas would continue and the effects would be similar to those discussed under adding roads and motorized trails and Open Areas to the NFTS. This means that about 29 miles of unauthorized routes, and 20 acres of unauthorized Open Areas could receive use within the habitat under the No Action alternative.

Effects Due to Additions to the NFTS: There are no roads, motorized trails or Open Areas identified to add to the NFTS under this alternative; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Under this alternative, there are no proposed changes to the NFTS. Since there are no changes to seasonal closures for the NFTS in this alternative, there would be no decrease in the negative effect upon shrubland habitat effectiveness.

ALTERNATIVE 2 – PROPOSED ACTION

Effects due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF under this alternative. Prohibition of cross-country travel would limit motor vehicle use to managed Open Areas and NFTS, private, and other public roads and motorized trails. The effects described Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 44 miles of roads and motorized trails and 6 acres of Open Areas are proposed for addition to the NFTS. Of the 44 miles of roads and motorized trails added, about 0.4 mile would be added to shrubland habitat. None of the Open Areas would be added to this habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 8 more miles of roads and motorized trails within shrubland habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 32 percent.

ALTERNATIVE 3

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2.

Effects Due to Additions to the NFTS: Under this alternative, no roads, motorized trails or Open Areas are proposed for addition to the NFTS; therefore, there would be no direct or indirect effect to the habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads). Under this alternative, there would be no changes to the NFTS. Effects are the same as Alternative 1.

ALTERNATIVE 4

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas and NFTS, private and other public roads and motorized trails. The effects are the same as described in Alternative 2. The effects described Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 51 miles of roads and motorized trails and 37 acres of Open Areas are proposed for addition to the NFTS. Of the 51 miles added, about 2 miles would be added to shrubland habitat. Of the 37 acres of Open Areas added, about 3 acres would be added to shrubland habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 11 more miles of roads and motorized trails within shrubland habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 39 percent.

ALTERNATIVE 5

Effects Due to the Prohibition of Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of unauthorized routes and Open Areas. Motor vehicle use would be limited to managed Open Areas, and NFTS, private, and other public roads and motorized trails. Direct and indirect effects are the same as described in Alternative 2. The effects described Alternative 1 would not occur.

Effects Due to Additions to the NFTS: Under this alternative, 85 miles of roads and motorized trails and 105 acres of Open Areas are proposed for addition to the NFTS. Of the 85 miles added, about 3 miles would be added to shrubland habitats. Of the 105 acres of Open Areas added, about 8 acres would be added to shrubland habitat.

Effects Due to Changes to the NFTS (includes season of use, vehicle class, and opening or closing roads): Note: vehicle class types result in the same amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type (see assumptions in Section 3.13.1). Therefore, changes to class of use are not expected to have any detectable impact on wildlife or their habitat, as discussed above under Alternative 2.

Changes to the NFTS that would have a positive effect on habitat and habitat effectiveness are year-round closures. About 4 more miles of roads and motorized trails within shrubland habitat would be closed year-round under this alternative, increasing the amount of roads and motorized trails closed year-round in the habitat by 19 percent.

Shrubland Habitat - Cumulative Effects

As discussed above, roads, motorized trails and Open Areas within ¼ mile of the habitat are likely to increase: (1) nesting, resting and foraging disturbance; (2) nest predation; and/or (3) habitat avoidance. Those impacts are most significant during the reproductive seasons and may reduce reproductive success. Reproductive season for the fox sparrow begins in mid-May and ends in early August. The periods of greatest sensitivity occurs during nest building, and incubation when the individual is more likely to abandon the site (Gotmark 1992 in Knight and Gutzwiller 1995). Another period of sensitivity is the nestling/fledgling period when parental attentiveness may be disturbed; thereby, disrupting feeding patterns and increasing the chance that young may become stressed and/or predated upon.

The higher the road and motorized trail density, the greater the amount of habitat taken out of effective MIS use. When density exceeds a certain point, the habitat does not provide any place for undisturbed reproduction, foraging, or resting to occur. If density remains too high, habitat is likely avoided. Species population can be reduced as a result. Existing motorized travel has created a route density of 2.42 mi./sq.mi within shrubland habitat and has likely impacted as much as 65 percent of it by decreasing its effectiveness for MIS. A comparison of route densities and percent habitat impacted is provided in the table below.

Other activities have likely contributed cumulative effects upon the habitat. There are 28 active cattle allotments encompassing about 743,247 acres within the analysis area. They permit 17,000 animal unit months (AUMs). Some of the cattle allotments encompass shrubland habitat. While cattle prefer grasses and forbs, they browse on young shrubs and new growth of woody

vegetation in the spring. Furthermore, there tends to be a dietary shift towards woody vegetation late in the season (about a month before most cattle are taken off the allotments), because grasses and forbs have cured. In addition to seasonal browsing, cattle can impact the effective use of shrubland habitat by incidentally knocking down nests. Nevertheless, impact by cattle is limited by standards and guidelines in the 1995 LRMP amendment which limits use of woody shrubs to 20 percent annual leader growth when rangeland is in satisfactory condition and 10 percent if in unsatisfactory condition (USDA-FS 1995b, p. 2-15). Furthermore, because the majority of shrubland habitat on the Forest is mature to decadent, cattle do not tend to utilize it to a large degree. Therefore, it is assumed that only a small percent of shrubland habitat within the analysis area is impacted by cattle grazing.

About 53,192 acres within the analysis area have been impacted by timber management activities, with about 1,537 acres or 3 percent of shrubland habitat being impacted. Furthermore, there are about 50,805 acres of plantations within the analysis area, with about 7,380 acres or 15 percent of shrubland habitat being impacted. Some double counting of impacted acres likely occurs since both harvesting and planting occurs on the same piece of land over the long run. Nevertheless, the acres of impacted habitat are thought to be a fair representation. Treated acres experience a temporary reduction and/or absence of shrubs. Nevertheless, shrubs tend to re-establish within a year of treatments. Therefore, these activities rejuvenate shrubland habitat and benefit it in the long-run.

Finally, about 22,274 acres of prescribed burns have/will occur within the analysis area, with about 2,026 occurring in shrubland habitat. Furthermore, about 55,605 acres of wildfires have occurred in the analysis area, with about 9,922 occurring in shrubland habitat. According to historical fire records of the High Sierra Ranger District, it is likely that about 1,866 additional acres of wildfire will occur on the district in the foreseeable future. The same acreage is assumed for the Bass Lake RD. Immediate impact of prescribed burns and wildfires in shrubland habitat is a decrease in its availability. However, shrubs tend to resprout within a year after prescribed burns and within 5 years after wildfires. Therefore, burns tend to rejuvenate the habitat. Wildfires in forested habitats likely increase shrubland habitat. Not all of the acres burned in wildfires can be replanted due to funding and/or site limitations; and they tend to convert to shrubland habitats.

Table 3- 200 below summarizes the differences that would occur within shrubland habitat under each alternative.

Table 3- 200. Indicators per Alternative for Shrubland Habitat

	Acres Open to Motorized Cross-country Travel	Miles of NFTS and other Private/ Public Roads and Motorized Trails (added miles included in total above)	Miles of NFTS Roads and Motorized Trails Closed Year-round*	Miles of Unauthorized Routes that Can Receive Motorized Travel	Route Density (mi./sq. mi.)	Acres of Managed Open Areas (added Open Areas included in total above)	Acres of Unauthorized Open Areas that Can Receive Motorized Travel	Acres and Percent Habitat Impacted by a Decrease in Effectiveness for MIS
Alt1	46,459	161 (+0)	17	28	2.39	1.5 (+0)	20	32,297 = 64%
Alt2	0	161.4 (+0.4)	25	0	2.04	1.5 (+0)	0	19,428 = 38%
Alt3	0	161 (+0)	17	0	2.04	1.5 (+0)	0	21,953 = 43%
Alt4	0	163 (+2)	28	0	2.06	4 (+2.5)	0	18,575 = 37%
Alt5	0	164 (+3)	21	0	2.08	10 (+8.5)	0	21,210 = 42%

Relationship of Shrubland Habitat to MIS

Fox Sparrow

The MIS chosen for this habitat type is the fox sparrow. Recent empirical data from the Sierra Nevada indicate that, in the Sierra Nevada, the fox sparrow is dependent on open shrub-dominated habitats for breeding (Burnett and Humple 2003, Burnett et al. 2005, Sierra Nevada Research Center 2007 in USDA-FS 2008).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trend

As determined in the MIS Report for Travel Management (Strand and Sanchez 2010), current motorized travel on the SNF is affecting up to 32,760 acres of shrubland habitat or 4 percent of the acres available within the Sierra Nevada bioregion. Affected acres were derived by summarizing the acres of habitat impacted by existing and added roads, motorized trails and Open Areas. As reasoned in the MIS Report, acres of habitat that are only occasionally traversed by cross-country travel (i.e. no unauthorized routes exist upon them) were not included in the calculation of affected acres. Acres of habitat impacted by roads and motorized trails were derived by placing a ¼ mile buffer along all roads and motorized trails that are open either year-round or seasonally. Roads and motorized trails that are closed year-round were not included in the calculation of affected acres, as reasoned in the MIS Report. A ¼ mile buffer is conservative and likely overestimates the percent of habitat affected. Therefore, it is likely that less than 4 percent of the habitat within the Sierra Nevada bioregion has likely been affected by motorized travel on the SNF. As such, motorized travel on the SNF has not likely affected shrubland habitat at a bioregional level, nor has it likely affected the distribution of fox sparrow across the bioregion.

The Travel Management Project alternatives would continue to directly, indirectly, and cumulatively effect up to 18,575 acres of shrubland habitat (lowest) under the Alternative 4 and 32,297 acres (highest) under the No Action alternative. As explained above, the acres affected would likely be less. The Travel Management Plan would **not** result in a change of : (1) habitat acres; (2) canopy cover class; or (3) CWHR size class. However, effectiveness of the habitat would be impacted due to: (1) human disturbance, (2) edge effects, and (3) habitat avoidance and abandonment. Nevertheless, because the acres affected range from less than 2 to 4 percent of the total Sierra Nevada-wide acreage, none of the alternatives would likely affect shrubland habitat at the bioregional level, nor would they likely affect the distribution of fox sparrow across the Sierra Nevada bioregion.

Compliance with the LRMP, Travel Management Rule and Other Direction

Table 3- 201. Compliance with LRMP and Other Direction

Guidance from 2004 Record of Decision for the Sierra Nevada Forest Plan Amendment (Framework)	Complies with LRMP and Other Direction				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
California Spotted owl and Northern Goshawk (Standard and Guideline 82)		X	X	X	X
Fisher and Marten (Standard and Guideline 87 and 89)		X	X	X	X
Riparian Habitat (Standard and Guideline 92)			X	X	X
Guidance from the 1991 LRMP					
Deer areas (winter range, population centers, holding areas)	X	X	X	X	X

Alternatives 2-5 are in compliance with the Travel Management Rule as they minimize harassment of wildlife and the significant disruption of wildlife habitats by implementing the design features as part of the season of use. Roads and motorized trails were reviewed and ground-truthed through field reconnaissance to determine if habitat was being impacted and if so, season of use was implemented along with surveys to determine location of nests for birds or survey information from Pacific Southwest Research for furbearers. Deer season of use was implemented to reduce harassment according to LRMP.

Migratory Landbird Conservation on the SNF

Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities. As part of the Travel Management process, the SNF has conducted an assessment of existing roads and trails within SNF boundaries. Any new construction, reconstruction and maintenance of system roads or trails will be conducted under a separate NEPA analysis and decision. Because current travel management efforts are directed at identifying which existing unauthorized routes will be formally added to the NFTS while prohibiting cross-country travel, and because there is no expectation of new construction or development, no changes in the distribution or abundance of habitats available to migratory prohibition of cross-country travel is expected to result in less use across the landscape. Therefore, habitat functionality is expected to remain similar or more than, and levels of disturbance related to use are expected to remain similar to or less than, predecisional levels.

Summary of Determinations for Threatened and Forest Service Sensitive Species

It is my determination, under Alternative 1, Travel Management may affect not likely to adversely affect the **Valley Elderberry Longhorn Beetle** because cross-country travel may disturb VELB habitat.

It is my determination, under Alternatives 2-5, Travel Management will have **no effect** to the **Valley Elderberry Longhorn Beetle** because the Fish and Wildlife design criteria will be

implemented. The habitat will not be disturbed because at this time there are no roads and motorized trails designated in VELB habitat.

It is my determination, under all alternatives except Alternative 1, Travel Management will have **no effect** to the **bald eagle** because the Fish and Wildlife design criteria will be implemented and there are no roads or motorized trails in bald eagle habitat. Under Alternative 1, it is my determination the Travel Management FEIS **may impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability for bald eagles** because there is a motorized trail designated within 1/8 mile of a bald eagle nest.

It is my determination, under all alternatives; Travel Management **may impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owls and Northern goshawks** because while some habitat will be impacted by noise disturbance from motorized use; however, it is minimized by the season of use being applied to both species where applicable. The Resource Issue Codes WL-1 and WL-2 are applied if there is a known nest site within ¼ mile of a road or motorized trail. There is a minimal difference between road densities; however, when you look at the miles of roads and motorized trails being added there would be an effect to the amount of habitat used by the species. The seasonal closures are a benefit to wildlife because it protects habitat for the species during the critical nesting and fledgling time.

Under Alternative 5 (least restrictive), there are approximately 2 percent of the spotted owl PACs potentially being impacted and of that 12.6 miles are within PACS and if the roads and motorized trails is within ¼ mile of the nest location then Resource Issue Code WL-2 will be applied reducing the disturbance to the owl.

As for the Northern goshawk, under Alternative 2 (least restrictive), there are 2.4 miles of roads and motorized trails within PACs but not known nest sites. If nest sites are located, Resource Issue Code WL-1 will be applied to reduce disturbance to the birds. It is less than 2 percent of the habitat being affected across the project area.

It is my determination, under all alternatives; Travel Management **may impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl** because habitat will be impacted minimally and there are few roads and motorized trails that are adjacent to meadows there is the potential for vegetation to be crushed or trampled along meadows.

It is my determination, under Alternatives 1 and 5, Travel Management **may impact individuals but not likely to cause a trend to a Federal listing or a loss of viability for the willow flycatcher** because there is only one motorized trail adjacent to an occupied meadow.

It is my determination, under Alternatives 2-4; Travel Management will have **no impact for the willow flycatcher** because there are no roads and motorized trails adjacent to any occupied meadows or suitable habitat.

It is my determination, under all alternatives, Travel Management **may impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability** for all three bat species, Western red bat, Pallid bat, Townsends big-eared bat, because the species may utilize the habitat where noise disturbance could occur from trampling or crushing of vegetation. The disturbance should be minimized because all three species would benefit from wet weather closures which would be a time when they use the habitat.

It is my determination, under all alternatives; Travel Management **may impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the marten** because habitat will be impacted by noise disturbance from motorized use. There is a minimal

difference between road densities; however, when you look at the miles of road being added, there would be an effect to the amount of habitat used by the species. If there is an increase in seasonal closures, there would be a benefit to the marten which would minimize the effects because more habitat would be protected during critical foraging and denning periods.

It is my determination that Alternative 1 (No Action) of the Travel Management Project **may affect individuals of a species has been found warranted for federal listing, and is likely to result in a further downward trend and loss of viability.** Given the isolated nature of the Southern Sierra Fisher population and continued cross-country travel under this alternative, significant impacts from disturbance, fragmentation and increased vehicle related mortality are likely to occur. Based on past route expansion levels, habitat quality would be expected to continue to decline until the viability of the fisher population in the project area is threatened.

It is my determination, under Alternatives 2 and 5; Travel Management **may affect individuals of a species that has been found warranted for federal listing, but is unlikely to contribute toward a downward trend and loss of viability for the Pacific fisher** because habitat will be impacted by noise disturbance from motorized use. There is a minimal difference between road densities; however, when you look at the miles of roads and motorized trails being added, there would be an effect to the amount of habitat used by the species. If there is an increase in seasonal closures, there would be a benefit to the fisher because more habitat would be protected during critical foraging and denning periods.

Impacts to important habitat features such as snags or downed logs utilized for den and resting purposes, or for cover near roads, would be minimally impacted through the implementation of these alternatives. Felling of snags and movement of down logs would be limited to existing public health and safety hazards which occur adjacent to trails and roads. Given that the availability of hazard trees typically occurs in a sporadic fashion over a relatively small linear strip of habitat associated with roadway, their influence in reducing overall background levels of these resources on the larger landscape is small.

Existing canopy closure associated with forested stands would not decrease below current levels since further route expansions would not occur with the prohibition of cross-country travel. Some passive recovery of canopy in the form of shrub cover may increase over the mid to long term as vegetation returns along unauthorized roads and motorized trails abandoned with the elimination of cross-country travel.

Alternatives 2, 4 and 5 significantly reduce road and motorized trail density from existing levels within high suitability fisher habitat by 0.040 (Alternative 2) to 0.073(Alternative 5) miles/sq mi depending on the alternative. These conditions would provide for lower levels of motorized disturbance, and decrease potential indirect anthropogenic influences such as disease transmission and inadvertent fire starts associated with human access.

Although an improvement from current conditions, these alternatives would also add between 6.8 and 14.7 miles of roads and motorized trails in high suitability fisher (60-79 and 80-100 percent probability added together for action alternatives) habitat to the NFTS depending on the Alternative. However, the added roads and motorized trails proposed are comprised by native (dirt) surfaced roads or trails of smaller widths, necessitating slower vehicle speed. As such, it is not anticipated these would increase incidence for vehicle-related mortality due to collision to occur. The cumulative route densities associated with these alternatives according to Freel (1991) would maintain habitat within the range of low capability. But a review of female fisher home ranges found female fishers successfully reproducing in areas with route densities far above that noted in these alternatives, suggesting ability for animals to become habituated to at least some levels of motorized use. This is also supported by Zielinski et al. (1997) and the preliminary results noted from long term status and trend monitoring for fisher populations showing

consistent distribution and index of detections at existing route density and current use levels. Given that route density would be decreasing from current levels, it is unlikely that these proposed actions would result in substantial reductions in habitat quality. Therefore, these actions are not anticipated to reduce the viability of the fisher population in the project area.

Cumulative actions from prior or future projects are of limited magnitude and have not contributed long-term degradation of fisher habitat.

It is my determination that Alternative 3 (system roads and motorized trails only) of the Travel Management Project will have **no effect** on Pacific fisher. No roads and motorized trails will be added to the NFTS, so there would be no direct or indirect effects to this species or its habitat. From current management, this would eliminate approximately 83.6 miles of cross-country unauthorized routes from high suitability fisher habitat. Only the existing NFTS roads and motorized trails would remain.

It is my determination that Alternative 4 of the Travel Management Project **may affect individuals of a species that has been warranted for federal listing, but is unlikely to contribute toward a further downward trend and loss of viability.** This alternative adds 8.7 miles of roads and motorized trails to the NFTS in high suitability fisher habitat resulting in 74.9 fewer miles of motorized route in this habitat. The cumulative route density in this alternative would maintain habitat within the range of moderate capability using the model created by Freel (1991) and is expected to improve habitat conditions for fisher over the long term.

3.14 Aquatic Biota

3.14.1 Introduction

Management of aquatic-dependent species and habitat and maintenance of a diversity of animal communities is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on NFS lands must be planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species or lead to a trend toward listing or loss of viability of Forest Service Sensitive species. In addition, management activities should be designed to maintain or improve habitat for Management Indicator Species to the degree consistent with multiple-use objectives established in each Forest Land and Resource Management Plan (LRMP). Management decisions related to motorized travel can affect aquatic species by increasing human-caused mortality, causing changes in behavior due to disturbance and habitat modification (Gaines et al. 2003, Trombulak and Frissell 2000, USDA-FS 2000b). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife and avoid significant disruption of wildlife habitat, while providing for motorized public use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to motorized travel on NFS lands must consider effects to wildlife and their habitat.

Analysis Framework: Statute, Regulation, LRMP and Other Direction

Direction relevant to analysis of the alternatives as it affects aquatic biota includes:

Endangered Species Act (ESA) - The ESA of 1973 (16 USC 1531 et seq.) requires that any action authorized by a Federal agency not be likely to jeopardize the continued existence of a threatened or endangered (TE) species or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible Federal agency to consult the USFWS and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE species to ensure management activities are not be likely to jeopardize the continued existence of a TE species or result in the destruction or adverse modification of habitat of such species that is determined to be critical. This assessment is documented in a Biological Assessment (BA) and is summarized or referenced in this Chapter.

Forest Service Manual and Handbooks (FSM/H 2670) - Forest Service Sensitive (FSS) species are species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on National Forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in a Biological Evaluation (BE) and is summarized or referenced in this Chapter.

Management Indicator Species - NFMA and the Secretary of Agriculture's implementing regulations (36 CFR 219) require selection of management indicator species (MIS) and evaluation of effects of alternatives on the viability and diversity of plant and animal communities. Management Indicator Species (MIS) are animal species identified in the SNF MIS Amendment Record of Decision (ROD) signed December 14, 2007. Guidance regarding MIS is set forth in the 2001 LRMP as amended by the 2007 SNF MIS Amendment ROD. The effects of the project on MIS are to be assessed during the preparation of NEPA documents prior to project

implementation to determine if project modifications are necessary to reduce potential negative effects (FSM 2534.1). MIS are addressed in a separate report (Strand and Sanchez 2010).

The SNF Land and Resource Management Plan (LRMP) (USDA-FS 2001, 2004) - Forestwide standard and guidelines (S/G) that were not superseded by the 2001 or 2004 amendments applicable to the Travel Management FEIS aquatic species and habitats include:

- Establish a 200-foot zone on each side of all reaches of the tributaries to Portuguese Creek and Cow Creek where Lahontan cutthroat trout currently occur on all Class I, II and III tributaries above those reaches. Apply the following standards for this project within this zone:
- No motor vehicles will be allowed off permanent roads except as authorized by permit or contract;
- Ephemeral channels may only be crossed with equipment after consultation with a fisheries biologist (S/G #39)
- Give primary management emphasis in riparian areas to protect and enhance the riparian ecosystem, riparian vegetation, water quality, soils, fish and wildlife resources. (S/G #69)
- Streamside Management Zone determination will be based on methods described in FSH 2509.22, Sierra Supplement 1 which gives specific direction for width determinations. (S/G #70)
- When on-site project evaluations identify the need to afford protection to intermittent and/or ephemeral drainages, the protection zone widths will be defined in accordance with the Forest Streamside Management Zone determination process as described in the FSH 2509.22, Sierra Supplement 1. (S/G #72)
- Maintain or enhance productivity of SNF meadows to accommodate wildlife and range resources. (S/G #75)
- Protect streamside zones by locating new roads outside of riparian areas, except at stream crossings (S/G #77).
- Avoid constructing new roads within the perimeter of meadows and other riparian areas where opportunities exist to relocate or obliterate existing roads (S/G #78).
- When existing routes through riparian areas and meadows are not compatible with riparian dependent resources, consider re-routing (S/G #79).
- Applicable to All Dispersed Recreation Analysis Area in Management Areas 2 and 11: Designate four-wheel drive and trail bike route termini at popular lake and stream locations. These termini will normally be a minimum of 300 feet to a maximum of ¼-mile from the attraction and will have parking facilities with vehicle controls (S/G #306).

Sierra Nevada Forest Plan Amendment (SNFPA). The Forestwide management standards and guidelines (S&G) in the Record of Decision (ROD) (USDA-FS 2004a pages 62 – 66) for the 2004 Sierra Nevada Forest Plan Amendment applicable to motorized travel management and aquatic species and habitat include (also refer to the project's Riparian Conservation Objectives and Consistency Report which can be found in the Travel Management FEIS – Appendix J):

Wetland and Meadow Habitat

- To protect watershed resources, meet the following standards for road construction, road reconstruction and road relocation: (1) design new stream crossings and replacement stream crossings for at least the 100-year flood, including bedload and debris; (2) design stream crossings to minimize the diversion of streamflow out of the channel and down the road in the event of crossing failure; (3) design stream crossings to minimize disruption of natural hydrologic flow paths, including minimizing diversion of streamflow and interception of surface and subsurface water; (4) avoid wetlands or minimize effects to natural flow patterns in wetlands and (5) avoid road construction in meadows (S&G 70).

Riparian Habitat:

Designate riparian conservation area (RCA) widths as described in Part B of the SNFPA ROD (p. 42). The RCA widths displayed in Part B may be adjusted at the project level if a landscape analysis has been completed and a site specific RCO analysis demonstrates a need for different widths. (S&G 91)

Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives at the project level and the Aquatic Management Strategy (AMS) goals for the landscape. Ensure that appropriate design features are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species (S&G 92).

Water Quality and Temperatures

- For waters designated as “Water Quality Limited” (Clean Water Act Section 303(d)), participate in the development of Total Maximum Daily Loads (TMDLs) and TMDL Implementation Plans. Execute applicable elements of completed TMDL Implementation Plans (S&G 95).
- Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages. (S&G 96)

Species Habitat Viability and Watershed Condition

- Maintain and restore the hydrologic connectivity of streams, meadows, wetlands and other special aquatic features by identifying roads and trails that intercept, divert or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity. (S&G 100)
- Ensure that culverts or other stream crossing do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability and duration of floodplain inundation and water table elevation in meadows, wetlands and other special aquatic features. (S&G 101)
- Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement design features and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs. (S&G 102)

- Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, motor vehicles and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites, sites authorized under Special Use Permits and designated motor vehicle routes. (S&G 103)
- At either the landscape or project-scale, determine if the age class, structural diversity, composition and cover of riparian vegetation are within the range of natural variability for the vegetative community. If conditions are outside the range of natural variability, consider implementing mitigation and/or restoration actions that will result in an upward trend. Actions could include restoration of aspen or other riparian vegetation where conifer encroachment is identified as a problem. (S&G 105)
- Identify roads, trails, motor vehicle trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions. (S&G 116)
- Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (*Sphagnum* spp.), (2) mosses belonging to the genus *Meessia* and (3) sundew (*Drosera* spp.) Complete initial plant inventories of bogs and fens within active grazing allotments prior to re-issuing permits. (S&G 118)
- Recommend restoration practices in: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices, for example, road building, recreational use, grazing and timber harvests, which may be contributing to the observed degradation. (S&G 122)

Effects Analysis Methodology

The Effects Analysis Methodology section describes assumptions specific to aquatic biota, resource indicators with justifications, information sources used to support the analysis, timeframes for effects (short and long term) and the spatial boundaries of the effects analysis.

Area of Effect for Aquatic Resources / Analysis Area

The spatial boundary for the effects analysis is the project boundary as it relates to the HUC6 level (3,800 to 115,000 acres). The project area boundary does not include wilderness, however, since HUC6 boundaries cross into designated wilderness, indirect and cumulative effects to aquatic biota carry into wilderness and will be discussed accordingly.

The project area is broken into analysis units for the affected environment discussion. Cumulative watershed effects and aquatic riparian species impacts are analyzed at the Forest and the HUC8 (500-3,000 acres) watershed scale (HUC7s have not been delineated on the SNF).

Specific areas requiring analysis include hydrologically sensitive areas, unauthorized routes, Open Areas, parking, and staging areas, and NFTS roads and trails with proposed changes in season of use or vehicle class. Hydrologically sensitive areas include all designated riparian protection areas as defined in the Sierra LRMP (1991) and SNFPA ROD (2001, 2004):

- a. Riparian Management Areas (RMAs),
- b. Streamside Management Zones (SMZs),
- c. Critical Aquatic Refuges (CARs) and
- d. Riparian Conservation Areas (RCAs),

Examples of hydrologically sensitive areas include streams, springs, lakes, reservoirs, fens, meadows and marshes. All areas of perennial and seasonal standing or running surface water and areas of perennially or seasonally saturated soil are included within these areas. RMAs and SMZs are contained within RCAs, which are the designated area used for GIS analysis of hydrologically sensitive areas.

In general RCAs for the project area were delineated based on using the current SNF stream layer ("snfstrm982ar" GIS layer – dated September 17, 2002) and the Strahler (1957) method of stream orders. The assumptions on how RCAs and SMZs were delineated for the project area are described below:

1. All order 1 stream channels lack annual scour or deposition and therefore are considered ephemeral rather than seasonal streams under the Sierra Nevada Forest Plan Amendment (USDA-FS 2001, 2004), unless associated with a meadow or spring.
2. All order 2-3 channels are intermittent or seasonal streams with annual scour or deposition. Drainages below meadows are included under this category, unless they are already associated with an order 4 system or greater.
3. Perennial streams begin at order 4 channels and include all channels order 4 and higher. It is recognized that there would be some variation by elevation.
4. Springs, lakes and meadows on the SNF GIS coverage are correct. Project-level analysis would improve the accuracy of this assumption.
5. RCA widths are considered as:

Table 3- 202. RCA Widths

Feature Type	Corresponding GIS Stream Order or Layer	RCA Width (feet)
Perennial streams	Order 4+	300 ft Each side of the stream, measured from the bank full edge of the stream
Seasonally flowing streams	Order 2 - 3	150 ft Each side of the stream, measured from the bank full edge of the stream
Ephemeral streams	Order 1	150 ft (each side of the stream, measured from the bank full edge of the stream) if associated with spring or meadow, otherwise none
Streams in inner gorge	Stream order varies	To top of inner gorge (at least 300 ft)
Special Aquatic Features (fens, bogs, springs, seeps, lakes, ponds, wetlands, etc)	Corresponding GIS layer or identified in the field	300 ft
Perennial streams with riparian conditions extending more than 150 feet from edge of streambank	Either mapped as 'meadows' or identified in the field	300 ft
Seasonally flowing streams with riparian conditions extending more than 50 feet from edge of streambank	Either mapped as 'meadows' or identified in the field	300 ft

Assumptions Specific to the Aquatic Biota Analysis

The following lists assumptions that are specific to aquatic species and habitat:

1. All vehicle class types (both greater than and less than 50" vehicle types) result in the same amount of disturbance effect to aquatic/riparian species and habitat. For percent of habitat directly impacted, 8 feet was assigned for an estimated average route width.
2. Open Areas, parking, and staging areas result in the same amount of disturbance effects to aquatic/riparian species and habitat. All were considered to have impacts of Open Areas.
3. Use of on unauthorized routes to be brought forward into the NFTS as NFTS roads or trails result in the same amount of disturbance on aquatic/riparian systems.
4. Habitat is already impacted in the short term. In the long term, available habitat will remain the same on proposed unauthorized routes added to the NFTS, but will increase to at least some degree on routes not added to the NFTS and subsequent passive restoration.
 - a. See soils analysis for further assumptions.
 - b. See definitions for duration of effects in the Effects Analysis Methodology section.

5. Springs, lakes and meadows on the SNF GIS coverage are correct. Project-level analysis would improve the accuracy of this assumption.
6. Aquatic/riparian species spend all or significant portions of their life cycles either in or moving through aquatic or riparian habitats.
7. Aquatic/riparian species occupy perennial (stream order 4 and greater) and/or intermittent (stream order 3) water type habitats. Stream order 2 channels are used in the development of the RCA analysis. They do not provide suitable habitat for aquatic/riparian species. Ephemeral channels (stream order 1) were not considered for aquatic/riparian species habitat except if associated with a meadow or spring. All stream order channels were considered in cumulative effects for habitat impacts related to sediment transport into downstream perennial and intermittent channels.
8. Appropriate species dispersal corridors using the California Wildlife Habitat Relationship program (CDFG 2005) were calculated for Threatened, Endangered and Sensitive species. The focus of this analysis is on suitable aquatic/riparian species habitat. If protocol level surveys could not be completed to determine habitat suitability or species occupancy, perennial and/or intermittent stream, meadow, spring and lake/pond habitat were assumed occupied.
9. Evaluation of species effects were reviewed for consistency with the LRMP, and incorporated the "best available science", which included but was not limited to peer-reviewed literature, Forest survey information, material presented by researchers, and personal communications.
10. All proposed additions to the NFTS would be brought up to the appropriate forest road/trail maintenance standards following site specific design features outlined in the Route Cards (Appendix A). Project design features outlined in the Hydrologist report that are identified to account for aquatic/riparian species habitat protection will be implemented before the route is available for use. The determinations for Threatened, Endangered and Forest Service Sensitive species are made based on these design features being implemented.
11. Additional aquatic/riparian species design features for any proposed site specific work needed to bring unauthorized routes up to standard by other disciplines (ex. Hydrology, soils) would be applied separately for aquatic/riparian species protection and cannot change the determinations for species. The determinations for Threatened, Endangered and Forest Service sensitive species are made based on all design features being implemented.
12. Research has concluded that sediment from roads can result in adverse effects to streams and aquatic habitats (Dissmeyer 2000; Gucinski and others 2001; Meehan 1991).
13. The overall effect of roads to aquatic habitats is related to the amount of sediment movement from road surfaces and is highly variable within and among surface types and is related to levels of maintenance and road drainage and type of use of the road (Clinton and Vose 2003; Maholland 2002; Maholland and Bullard 2005).
14. All ML1 roads analyzed for a change in use to ML2 roads were currently being used and appeared as a ML2 road on the ground. Therefore, no real change in use or road condition would take place, no further action would need to be taken on the ground and therefore should not change the affects to aquatic/riparian species.
15. Change in vehicle use classes on NFTS roads from single to multiple-use will not affect aquatic habitat or species if use levels stay the same.
16. Passive recovery: The density of roads and trails at the watershed scale will not substantially change as a result of any of the action alternatives for at least the next 20 years. All of the

action alternatives involve the closure of unauthorized routes to vehicle use by the public without barrier, signs or active restoration of the roads. This leaves most unauthorized routes unobstructed for use by motorists. Without active restoration this type of passive restoration would take an undetermined amount of time for vegetation to re-colonize roadbeds and stabilize unconsolidated soils. Adverse effects of route use by motor vehicles include long-term damage to soil and water resources due to soil compaction, alteration of drainage patterns and destruction of vegetation. However, routes closed within the influence of riparian areas should recover more quickly than upland sites due to availability of water for plant growth and could increase potential habitat.

17. Season of use: The elimination of vehicle traffic on a road with hydrologically sensitive stream areas during periods of wet road conditions will result in less sediment being delivered from the road to the stream.
18. Season of use: The elimination of vehicle traffic in or near meadows during periods of wet road conditions will result in minimizing resource damage to meadow habitat including: rutting, alteration of the water pathways into meadow or streams associate with meadows and also will eliminate noise disruption during species breeding as well as initial species dispersal.

Data Sources

1. GIS layers with the following information:
 - Global Position Satellites (GPS) Route locations,
 - Habitats of Threatened, Endangered and Sensitive species,
 - Designated aquatic areas (i.e. CAR, RCA).
2. Site specific surveys/assessment of any localized sensitive aquatic/riparian habitats with unauthorized routes proposed to be added to the NFTS.
3. Site specific field review of proposed unauthorized routes in relation to aquatic/riparian habitat and condition.

Aquatic Biota Methodology by Action

The analysis methodologies for each of the four actions and cumulative effects that make up the alternatives are described below.

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Project boundary as it relates to the 6th code Hydrologic Units (HUC6) level

Indicators:

- 1) Miles of unauthorized routes and Open Areas, parking, and staging areas for motor vehicle use within (i.e. stream crossings) or adjacent (RCA) to aquatic resources, including meadows and streambanks;
- 2) Miles of unauthorized route and Open Areas, parking, and staging areas for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources;

3) Density of unauthorized routes open for motor vehicle use potentially affecting aquatic TES;

4) Number of unauthorized routes and Open Areas, parking, and staging areas for motor vehicle use within habitats of known occupied or potential habitat for TES species.

Methodology: GIS analysis of existing unauthorized routes and Open Areas, parking, and staging areas in relation to aquatic species and habitat and interpretation based on observations and literature review.

Rationale: Literature indicates that location of routes in relation to habitat can affect aquatic species through mortality, disturbance and habitat modification (Moyle and Randall 1996, Trombulak and Frissell 2000, USDA FS 2000). Studies have documented that motorized travel can affect aquatic species by increasing human-caused mortality, changing behavior due to disturbance and modifying habitat (Gaines et al. 2003, Trombulak and Frissell 2000, USDA-FS 2000b).

2. Direct and indirect effects of adding facilities (presently unauthorized routes, trails and/or Open Areas, parking, and staging areas) to the NFTS, including identifying seasons of use and vehicle class.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Dependant on indicator.

Indicators:

1) Miles of unauthorized routes and Open Areas, parking, and staging areas for motor vehicle use within (i.e. stream crossings) or adjacent (RCA) to aquatic resources, including meadows and streambanks;

2) Miles of unauthorized routes and Open Areas, parking, and staging areas for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources;

3) Density of unauthorized routes open for motor vehicle use potentially affecting aquatic TES;

4) Number of unauthorized routes and Open Areas, parking, and staging areas for motor vehicle use within habitats of known occupied or potential habitat for TES species.

Methodology: GIS analysis of added routes in relation to habitat and hydrologically sensitive aquatic areas. For aquatic/riparian species habitat protection in relation to sediment, additional information through the hydrology analysis uses GIS analysis of the added features, combined with field data (California State OHV Commission green, yellow, red monitoring protocol, additional data collected at stream crossings) and known information about the affected environment (stream channel sensitivity, etc). Interpretation based on observations and literature review.

Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance and habitat modification (Moyle and Randall 1996, Trombulak and Frissell 2000, USDA-FS 2000b).

3. Changes to the NFTS (changing season of use, opening or closing roads, and change in vehicle class).

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Dependant on indicator.

Indicators:

- 1) Number of NFTS roads and trails closed for motor vehicle use within habitats of known or historically occupied by TES herpafauna during seasonal closure;
- 2) Miles of NFTS roads and trails open and closed for season closure period within hydrologically sensitive areas;
- 3) Acres of RCA protected during seasonal closure in relation to hydrologically sensitive areas;
- 4) Number/Percentage of sensitive areas being protected;

Methodology: GIS analysis of seasonal closures in relation to aquatic/riparian habitat. GIS analysis of changes to seasonal restrictions and year-round prohibitions. Interpretation based on observations and literature review.

Rationale: Limiting the seasons of use may provide beneficial effects to aquatic/riparian species and their habitat.

Species: Changes in breeding can occur for some amphibians due to noise levels. (Brattstrom and Bondello 1983, Karlstrom 1962). Roadside populations showed reduction in reproductive efficiency as the water-logged ground in a meadow readily transmits vibrations (Karlstrom 1962; Grinnell and Storer 1924). Traffic density has been related to population density on local frog and toad breeding chorus (Fahrig et al. 1995).

Sediment: Traffic on native surface roads during the rainy season generally results in elevated sediment production. Ziegler and others (2001) found that motorcycle passes during rainfall simulation caused elevated sediment production; they also cite another study that found a more marked result from truck traffic. They attribute the increased sediment production to the amount of loose material on the road surface that is available for transport, because the spike in sediment transport gets smaller with each successive vehicle pass; however, they note that if the new routes had become incised by flowing water, the erosion would have been more persistent.

Even in coarse-grained soils that do not develop rutting as a result of wet-weather use, more subtle surface deformation occurs that eventually renders the design shape of the road (crowning, drainage dips, etc) ineffective and leads to increased road surface erosion.

Focusing on roads in RCAs and stream crossings should highlight those segments that are more likely to have impacts to streams and riparian areas.

4. Non-Significant LRMP Amendments

As explained in section 3.1.1, the non-significant LRMP amendments do not have effects to aquatic/riparian species or habitat (including MIS habitat). The amendment changing the language of S&G 17 pertaining to the management of ML1 roads updates the direction of the LRMP to be consistent with national direction. The potential for impacts to aquatic/riparian species or habitat on unauthorized routes or areas have been analyzed under Action 3, Changes to the NFTS. The amendment changing ROS class has no relevance to aquatic/riparian species or habitat. The facilities proposed to be added to the NFTS within the ROS class area have been analyzed under Action 2, Adding Facilities to

the NFTS. Therefore the environmental consequences of these amendments will not be discussed further in the aquatic biota resources section.

5. Cumulative Effects

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial boundary: Project boundary as it relates to the HUC6 level including all HUC8s on the SNF that contain inventoried (2005) unauthorized routes and/or Open areas, parking, and staging areas were included in the analysis. The HUC8s are referred to as 'subdrainages'. Over threshold HUC8s are discussed at the HUC6 scale as well.

Indicator(s):

- 1) Miles of unauthorized routes and Open Areas, parking, and staging areas for motor vehicle use within (i.e. stream crossings) or adjacent (RCA) to aquatic resources, including meadows and streambanks;
- 2) Miles of unauthorized routes and Open Areas, parking, and staging areas for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources;
- 3) Density of unauthorized routes open for motor vehicle use potentially affecting aquatic TES;
- 4) Number of unauthorized routes and Open Areas, parking, and staging areas for motor vehicle use within habitats of known occupied or potential habitat for TES species.
- 5) Equivalent Roaded Acres (Baseline CWE Assessment- hydrology)

Methodology: GIS analysis of past/current, added and future routes in relation to habitat and important/sensitive aquatic areas and in context of other past/current and future management actions affecting terrestrial habitat.

The Detailed CWE Analysis includes interpretation of the risk of CWEs in the over TOC subdrainages, based on data sources 2, 3 and 5.

Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance and habitat modification (Moyle and Randall 1996, Trombulak and Frissell 2000, USDA FS 2000).

3.14.2 Affected Environment

Affected Environment – Forestwide

The SNF provides a diverse range of aquatic and riparian habitat types, ranging from low elevation ponds in chaparral woodland to glacial tarns near granitic alpine ridgelines. Elevations on the SNF range from about 1,000 to over 12,000 feet in elevation, thus representing habitat for a wide variety of aquatic/riparian species. Human activities such as dam building, water diversions, grazing, forest vegetation projects and mining have altered riparian and stream systems within the SNF. The Sierra Nevada Ecosystem Project (SNEP 1996) noted that across the Sierra Nevada bioregion, aquatic/riparian systems are the most altered and impaired habitats. In some instances these activities have altered water temperatures, water volume, stream-flow patterns, nutrient input and cycling, streambank stability and other characteristics important to

healthy stream and lake dynamics. Herpetofauna populations have severely declined throughout the Sierra Nevada at all elevations.

Roads, motorized trails, unauthorized routes and Open Areas, parking, and staging areas can affect stream channels, riparian areas and water quality. While erosion and localized changes to surface runoff can occur across the landscape, the risk of effects to streams, riparian areas and surface water quality are low if the use is far from hydrologically sensitive areas. Increased levels of sediment can reduce the amount and quality of aquatic habitat. On the Forest, surface water and riparian areas are protected by Riparian Conservation Areas (RCAs), thus RCAs provide a dual role in buffering streams from overland sediment transport and providing species habitat.

Aquatic Habitat

The SNF approximate 1,300,000 acres drain to the San Joaquin River system via the Merced, Chowchilla, Fresno and Kings Rivers, along with the mainstem San Joaquin River. Aquatic habitat includes an estimated 2,000 miles of perennial streams and rivers, along with 21,800 acres of lakes and ponds. The SNF aquatic systems provide habitat for 31 species of fish, with approximately 1,580 miles of stream occupied by fish (USDA-FS 1992). Perennial waters also provide potential habitat for a variety of amphibian and reptile species, as well as benthic macroinvertebrates. Additionally, there are 8,200 miles of intermittent or seasonal streams, some of which also provide habitat for fish, benthic macroinvertebrates and amphibians.

The Forest is within the Sacramento-San Joaquin zoogeographic province as described by Moyle (2002). Eight of the fish species occurring in the Forest are native, with most Forest waters barren of fish prior to man's transplanting activities starting in the late 19th Century. Moyle (1996, 2002) identifies much of the west slope of the Sierra Nevada range above 5,000 feet as being historically fishless due to glaciation during the Pleistocene and steep topography. However, it is noted that trout may have occurred up to 7,200 feet in the Middle Fork of the Kings River (Moyle et al 1996). The fish communities represented on the SNF include the "rainbow trout" and "pikeminnow-hardhead-sucker" assemblages for the zoogeographic province described by Moyle (2002). Elevations on the Forest above approximately 2,500 feet are within the rainbow trout (*O. mykiss*) assemblage. Habitats are characterized as having more riffle than pools, with water temperatures seldom exceeding 70 degrees Fahrenheit (21 degrees Celsius). Elevations less than 2,500 feet are generally part of the pikeminnow-hardhead-sucker assemblage described by Moyle (2002) as occurring within Sierra Nevada foothill streams. Water temperatures within this transitional area may exceed 70 degrees Fahrenheit (21 degrees Celsius) during the summer, especially during "dry and critically dry" water years. Trout species may persist within these areas, but water temperatures limit the populations and introduced centrachids (sunfish family) are better adapted to these habitat conditions.

Riparian Habitat

The SNF also provides a variety of riparian habitats associated with streams (both perennial and seasonal), meadows, springs and lakes. Riparian areas are high in biodiversity due to the water, relative humidity, cooler temperatures and complex cover provided. They also serve as important corridors for species dispersal. There are an estimated 15,750 acres of meadow on the Forest and 465,000 acres of Riparian Conservation Areas (RCA) (USDA-FS 2001 and 2004), associated with streams, meadows, springs and lakes.

Special Status Aquatic/Riparian Species

Aquatic/riparian species to be evaluated under the Travel Management FEIS, include SNF species that have been determined to be threatened, endangered or proposed under the ESA

(USDI – Fish and Wildlife Service (USFWS 2008) or are on the Pacific Southwest Region USDA Forest Service Sensitive Species list (USDA-FS 1998). Table 3- 203 represents a complete list of aquatic/riparian species that may occur or have habitat on the SNF (USDI – USFWS 2008). Some of these species may not occur or have habitat within the project area for the Travel Management FEIS. Effects from Travel Management on aquatic/riparian species are evaluated in the environmental consequences section of this document and in the Aquatic Species Biological Assessment/Biological Evaluation for the SNF Travel Management Plan (Barnes and Strand 2010) located in the project record.

Table 3- 203. Special Status Species that may occur or Have Habitat on the SNF

Common Name	Scientific Name	Status	Addressed in this Analysis
Invertebrates			
Conservancy fairy shrimp ¹	<i>Branchinecta conservatio</i>	Endangered	No
Aquatic Macroinvertebrate habitat	Numerous Species	Management Indicator Species	Yes
Fish			
Central Valley Steelhead ¹	<i>Oncorhynchus mykiss</i>	Threatened	No
Delta Smelt ¹	<i>Hypomesus transpacificus</i>	Threatened	No
Hardhead minnow ¹	<i>Mylopharodon conocephalus</i>	Forest Service Sensitive	No
Lahontan Cutthroat Trout	<i>Oncorhynchus clarki henshawi</i>	Threatened	Yes
Owens tui chubb ¹	<i>Gila bicolor snyderi</i>	Endangered	No
Paiute cutthroat trout ¹	<i>Oncorhynchus (=Salmo) clarki seleniris</i>	Threatened	No
Reptiles and Amphibians			
California Red-legged Frog	<i>Rana aurora draytonii</i>	Threatened	Yes
California Tiger Salamander ¹	<i>Ambystoma californiense</i>	Threatened	No
Foothill Yellow-legged Frog	<i>Rana boylei</i>	Forest Service Sensitive	Yes
Giant garter snake ¹	<i>Thamnophis gigas</i>	Threatened	No
Relictual Slender Salamander	<i>Batrachoseps relictus</i>	Forest Service Sensitive	Yes
Limestone Salamander ¹	<i>Hydromantes brunus</i>	Forest Service Sensitive	No
Mountain (Sierra Nevada) Yellow-legged Frog	<i>Rana (sierrae) muscosa</i>	Forest Service Sensitive, USFWS Candidate	Yes
Pacific Tree (Chorus) Frog habitat	<i>Pseudacris regilla</i>	Management Indicator Species	Yes
Western Pond Turtle	<i>Clemmys marmorata</i>	Forest Service Sensitive	Yes
Yosemite Toad	<i>Bufo canorus</i>	Forest Service Sensitive, USFWS Candidate	Yes

¹ Considered, but will not be analyzed any further within this document because they are not known to occur within the project area and/ or would not be affected by the project alternatives. Source: USDI - USFWS

Existing Conditions in the Analysis Units

The project area consists of ten analysis units draining to the Merced, Chowchilla, San Joaquin and Kings Rivers. The analysis units are included within thirty-seven 6th Hydrologic Units Codes (HUC6s). The HUC6 drainages vary between 3,800 and 115,000 acres in size. The analysis units drain approximately 800,000 acres via nearly 4,900 miles of perennial and intermittent stream

system (Table 3- 204). The perennial streams represent potential habitat for fish, amphibians, reptiles and benthic macroinvertebrates, while segments of the intermittent streams additionally provide seasonal habitat. For this analysis the potential habitat evaluated consists of perennial streams (1,084 miles) and third order (intermittent) streams (1,155 miles) for a total of approximately 2,235 miles. Order 2 intermittent channels (2,635 miles) have a defined stream channel, but generally flow for limited periods of time and are less likely to retain seasonal pools that might be utilized by fish, amphibians, reptiles or benthic macroinvertebrates. Ephemeral channels (stream order 1) typically flow during response to storm events or snowmelt. While they do not provide aquatic/riparian habitat, they can indirectly and cumulatively effect habitat through sediment contribution. The analysis units also include a variety of riparian habitats associated with streams (both perennial and seasonal), meadows, springs and lakes. There are an estimated 6,850 acres of meadow within the analysis units and 260,008 acres of Riparian Conservation Areas (RCA) (USDA-FS 2001 and 2004), associated with streams, meadows, springs and lakes.

Miles in Table 3- 204 are approximated based on GIS sorting of stream orders: ≥ 4 representing perennial streams, while stream orders 2 and 3 represent intermittent streams. Stream order 1 streams are considered ephemeral, except when associated with a meadow or springs. Riparian acres were calculated for meadow habitat per analysis unit as well as total Riparian Conservation Areas (RCAs) for all aquatic habitat including streams, meadows, lakes, ponds and springs. Total percent of the analysis unit located in an RCA was also calculated.

Table 3- 204. Miles of Stream by Analysis Unit

Analysis Unit	Streams (mi)			Lakes (ac)	Meadow (ac)	Total RCA acres ¹	Percent of Analysis Unit in RCA
	Perennial (order 4+)	Intermittent (order 2-3)	Ephemeral (order 1)				
SFM	102	308	781	26	678	22150	31%
WES	113	441	873	1068	918	26780	32%
GLO	142	391	758	79	1545	31899	35%
GAG	89	404	885	87	459	24970	29%
MAM	97	281	650	873	136	21776	40%
SSB	104	337	765	2009	563	22868	27%
EKP	18	33	74	2847	174	3432	26%
JCH	56	229	527	354	20	21444	46%
TAD	141	467	879	4947	1475	36398	32%
DNK	223	826	1659	99	887	48291	31%
TOTAL	1,084	3,789	7,851	12,389	6,854	260,008	33%

¹RCA acres do not include ephemeral (stream order 1) acres except if associated with meadows or springs.

There are also Critical Aquatic Refuges (CARs) in the project area. CARs are subdrainages containing populations of threatened, endangered, sensitive, rare or highly vulnerable aquatic/riparian species (USDA – FS 2001; 2004a). The location of the CARs with respect to analysis units is shown in Table 3- 205. A portion of The West Fork Portuguese Creek CAR extends outside and upstream of the GLO analysis unit into the wilderness. There are no unauthorized routes or Open Areas, parking or staging areas inventoried (2005), nor is vehicle access available to the portion of the CAR in the wilderness, therefore, there are no impacts from the project area will affect stream channel conditions upstream in the wilderness.

Table 3- 205. Critical Aquatic Refuges by Analysis Unit (AU); Acres within AU, Percent of Total CAR Acres

Analysis Unit	Acres of CARs in AU (acres)	CAR Name				
		Cow Creek acres / %	Jose Basin acres / %	Lower San Joaquin acres / %	Snow Corral acres / %	West Fork Portuguese Creek acres / %
SFM	0	0	0	0	0	0
WES	0	0	0	0	0	0
GLO	1199	0	0	0	0	1199 / 100%
GAG	478	0	0	478 / 2 %	0	0
MAM	10632	0	0	10632 / 52%	0	0
SSB	5	0	0	5 / 0%	0	0
EKP	0	0	0	0	0	0
JCH	26350	0	16847 / 87%	9502 / 46%	0	0
TAD	6135	4403 / 100%	148 / 1 %	0	1584 / 100%	0
DNK	2352	0	2352 / 12%	0	0	0
TOTAL:	47151	4403	19347	20618	1584	1199

Stream Channel Surveys

Segments of Forest streams have been surveyed for stream channel characteristics and stability between 1989 and 2008. Channels and riparian areas were evaluated using various methodologies, including Rosgen channel typing, Pfankuch channel stability ratings, Stream Condition Inventory plots and Proper Functioning Condition.

Rosgen Channel Typing: Channel reach types (Rosgen 1996) were determined based on channel attributes such as width/depth ratio; gradient; sinuosity; and substrate, along with sediment and transport characteristics. Approximately 560 miles of stream channel have been evaluated within the analysis units. Stream reaches with low sensitivity are bedrock/boulder (Rosgen channel types A1-2, B1-3, C1-2, F1-2 and G1-2) and represent approximately 50 percent of the streams evaluated. These channel types are considered inherently stable and are not significantly influenced by land management activities. However, sediment build-up can occur in these channels if upstream stream channels degrade. Effects to aquatic habitat focuses on those Rosgen channel types considered as sensitive, degraded or unstable (sensitivity of moderate and high in Table 3- 206).

Pfankuch channel stability ratings: The Pfankuch channel stability rating (USDA-FS 1975) was developed to evaluate the stream channel condition and stability from within the floodplain and stream channel. This method utilizes observation of attributes from the upper banks, lower banks and channel bottom. Channels are categorized into three ratings of poor, fair or good. Table 3- 206 indicates the Modified Pfankuch streambank stability condition. Channel types were evaluated in terms of sensitivity to disturbance as presented by Rosgen (1996), which varies by channel gradient and size of substrate. The Modifications proposed by Rosgen evaluate each channel type separately in terms of vegetative bank cover, stream bank cutting, channel bottom deposition, channel bottom scour and deposition and percent stable material. Under Rosgen's (1996) modified approach, channels are evaluated considering sensitivity to disturbance, recognizing channel characteristics rather than evaluating all channels against a common metric.

While approximately 90 percent of the naturally unstable channel types had at least Fair channel stability, 53 percent of the moderately sensitive channels were indicated to have Poor channel stability under the Modified Pfankuch approach. Table 3- 206 displays the channel stability conditions for sensitive, degraded or naturally unstable within the analysis units.

Table 3- 206. Stream Channel Sensitivity by Analysis Unit Based on Rosgen Channel Types

Analysis Unit	Rosgen Sensitivity (mi)			Modified Pfankuch Ratings Moderate sensitivity reaches (mi)			Modified Pfankuch Ratings High sensitivity reaches (mi)		
	Low	Moderate	High	Good	Fair	Poor	Good	Fair	Poor
SFM	1.8	0.0	4.5	0.0	0.0	0.0	3.8	0.7	0.0
WES	25.0	6.2	20.1	1.1	0.3	4.8	11.9	5.8	2.3
GLO	80.5	29.5	50.1	8.6	10.6	10.3	34.9	12.9	2.4
GAG	60.2	26.7	38.5	2.7	5.7	18.3	26.2	8.9	3.3
MAM	18.0	2.9	16.7	0.1	0.5	2.3	7.0	8.4	1.2
SSB	17.3	4.0	8.8	0.5	0.3	3.2	3.1	4.4	1.3
EKP	ND	ND	ND	ND	ND	ND	ND	ND	ND
JCH	12.4	0.8	2.2	0.0	0.2	0.6	2.0	0.1	0.0
TAD	46.5	8.8	16.0	3.3	2.4	3.1	6.1	4.7	5.3
DNK	42.3	2.2	19.3	0.5	1.1	0.6	9.5	4.2	5.5
TOTAL:	304.0	81.1	176.1	17	21	43	105	50	21

Stream Condition Inventory: Thirty-eight Stream Condition Inventory (SCI) (Frazier et al. 2005) plots are located across the SNF (Table 3- 207). SCI consists of stream features or attributes, that are useful in classifying channels, evaluating the condition of stream morphology and aquatic habitat and making inferences about water quality. Data on particle distribution and channel geometry information, large woody debris, bank configuration, shade, channel stability and limited water chemistry information was collected. Reaches are monumented to reduce variability when survey measurements are repeated.

Table 3- 207. Stream Segments and/or Tributaries that have had SCI Surveys Conducted

Analysis Unit	SCI Reaches (#)	Locations (Creeks)
SFM	0	ND
WES	5	Lewis Fork (Upper, Red Rock, Westfall Trib), Nelder, California
GLO	6	Jackass, Big (Big Sandy Trib), White Chief Branch, West Fork Portuguese, South Fork Willow, Big
GAG	3	South Fork Willow (Trib), Camino, Grizzly
MAM	0	ND
SSB	0	ND
EKP	0	ND
JCH	1	Jose
TAD	6	Glen Meadow, Trib to Glen Meadow, Laurel, West Fork Cow, South Fork Tamarack (Trib), Snow Corral Meadow
DNK	17	Big (5), Trib to Big, Summit, Rush, Oak Flat, Bull, Cottonwood Springs, Duff, Providence, Bear Meadow (2), East Fork Deer, Deer (a small portion of reach is in TAD)
TOTAL:	38	

SCI survey data are available in the project file. ND = No Data

Ten of the SCI plots include macroinvertebrate sampling. Four of the samples were collected from within the GLO analysis unit, with the remaining six within the WES analysis unit. Benthic Macroinvertebrates (BMI) have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition (Resh and Price 1984; Hughes and Larsen 1987; Resh and Rosenberg 1989). They are sensitive to changes in water chemistry, temperature and physical habitat. BMI are an important component of the foodweb, providing a food source for birds, mammals, amphibians, reptiles and fish. The samples associated with the SCI plots were collected between 2006 and 2007 and processed by Utah State University. Samples were evaluated using biotic indices from Hilsenhoff (1987) and Winget et al. (1979). Table 3- 208 displays information for the samples, including metric results from the Hilsenhoff (HB Index); Community Tolerance Quotient (CTQ: predicted and determined); and Biotic Community (BCI) indices for aquatic macroinvertebrates. Benthic macroinvertebrate data indicates water quality is at these sites ranges from fair to excellent (Vinson 2008).

Table 3- 208. Metrics for Benthic Macroinvertebrates Collected from Several SCI Plots

Subwatershed (HUC8)	Analysis Unit	HB Index	Indication	CTQp	CTQd	BCI	Water Quality Indication
501.0000	GLO	3.56	Slight organic enrichment	50	57	88	Excellent
501.5005	GLO	4.14	Moderate organic enrichment	80	57	140	Excellent
501.5006	GLO	4.09	Moderate organic enrichment	50	59	85	Excellent
501.5053	GLO	4.13	Moderate organic enrichment	50	58	86	Excellent
503.0010	WES	4.14	Moderate organic enrichment	50	61	82	Good
503.0011	WES	4.6	Moderate organic enrichment	80	67	119	Excellent
503.0055	WES	3.27	Slight organic enrichment	60	53	113	Excellent
503.0055	WES	3.14	Slight organic enrichment	50	50	100	Excellent
503.3001	WES	3.76	Slight organic enrichment	50	65	77	Fair
503.3002	WES	1.25	Little organic enrichment	53	23	230	Excellent

Proper Functioning Condition: The Proper Functioning Condition (PFC) protocol was developed as a qualitative method for assessing the condition of riparian-wetland areas. A stream reach is in Proper Functioning Condition (PFC) when physical processes are providing resilience to disturbances and characteristics are present to: dissipate energy during high flows (reducing erosion); filter sediment; improve flood-water retention and ground water recharge; develop root masses that protect streambanks from erosion; provide habitat for fish, wildlife and support other beneficial uses; and support biodiversity (USDI 1998). None of the assessed segments in the project area have rated Non-Functional. Table 3- 209 lists the stream segments where PFC surveys have been completed.

Table 3- 209. For each Analysis Units, the Total Number of Proper Function Condition (PFC) Assessments Completed and Associated Ratings

Analysis Unit	Total # PFC Assessments	PFC	FAR-UT	FAR-TU	FAR-DT
SFM	0	0	0	0	0
WES	1	1	0	0	0
GLO	5	1	2	1	1
GAG	6	3	3	0	0
MAM	5	3	1	1	0
SSB	0	0	0	0	0
EKP	0	0	0	0	0
JCH	2	1	0	1	0
TAD	2	0	1	1	0
DNK	10	7	1	2	0
TOTAL:	31	16	8	6	1

PFC = Proper function condition, FAR-UT = Functional at risk with an upward trend, FAR-TU = Functional at risk with trend unknown and FAR-DT = Functional at risk with a downward trend

NFTS Roads, Trails and Unauthorized Routes

The NFTS roads, trails and inventoried (2005) unauthorized routes present within the analysis units are an important component in understanding the effects of the alternatives being analyzed for this project. Although the effects of NFTS roads and trails are not included in the direct or indirect effects of these alternatives, they are relevant to the affected environment (and to cumulative effects, since their effects are similar to the effects of the actions being considered).

Road density is often used as an indicator of the risk for roads to affect stream flow and sediment contribution, which can result in alteration of aquatic habitat. Table 3- 210 displays the densities of NFTS roads and trails, inventoried (2005) unauthorized routes and the total motorized route density (the sum).

Table 3- 210. NFTS Road and Trail Miles (All Roads Located on SNF Regardless of Jurisdiction), Inventoried (2005) Unauthorized Routes and Their Associated Density by Analysis Unit

Analysis Unit	NFTS Roads & Trails Miles (mi) / Density (mi/mi ²)	Unauthorized Routes Miles (mi) / Density (mi/mi ²)	Total Motorized Routes Miles (mi) / Density (mi/mi ²)
SFM	156 / 1.42	23 / 0.20	179 / 1.62
WES	382 / 2.89	113 / 0.85	495 / 3.74
GLO	353 / 2.40	65 / 0.46	418 / 2.94
GAG	327 / 2.40	83 / 0.61	410 / 3.01
MAM	182 / 2.15	38 / 0.46	221 / 2.60
SSB	322 / 2.41	18 / 0.14	340 / 2.55
EKP	45 / 2.18	21 / 1.02	66 / 3.20
JCH	193 / 2.65	22 / 0.30	215 / 2.95
TAD	413 / 2.34	109 / 0.62	522 / 2.96
DNK	551 / 2.29	59 / 0.25	610 / 2.54
TOTAL / AVERAGE	2924 / 2.34	552 / 0.44	3476 / 2.78

Total motorized route miles include all roads, motorized trails and unauthorized routes in each analysis unit (Gott 2010).

The highest density of NFTS roads and trails and total motorized routes occurs in WES, which also has the second highest unauthorized route density. Density in EKP is high, largely because the analysis unit was drawn as a corridor around the roads. GAG also has a relatively high density of both NFTS roads and trails, and unauthorized routes.

Table 3- 211 shows the densities within RCAs. As previously noted, RCAs are areas of high species biodiversity and affects to these areas can directly affects species and indirectly affect aquatic/riparian habitat.

Table 3- 211. Miles of Roads and Trails and Unauthorized Routes Located in RCAs with the Associated Density by Analysis Unit

Analysis Unit	Within RCAs		
	NFTS Roads & Trails Miles (mi) / Density (mi/mi ²)	Unauthorized Routes Miles (mi) / Density (mi/mi ²)	Total Motorized Routes Miles (mi) / Density (mi/mi ²)
SFM	47 / 1.36	7 / 0.21	54 / 1.58
WES	134 / 3.19	36 / 0.85	170 / 4.05
GLO	134 / 2.19	27 / 0.53	161 / 3.22
GAG	104 / 2.67	24 / 0.62	128 / 3.29
MAM	64 / 1.89	17 / 0.51	81 / 2.40
SSB	91 / 2.55	4 / 0.12	95 / 2.67
EKP	17 / 3.17	8 / 1.49	25 / 4.66
JCH	92 / 2.79	10 / 0.31	102 / 3.07
TAD	149 / 2.61	31 / 0.54	180 / 3.16
DNK	176 / 2.34	15 / 0.28	191 / 2.53
TOTAL / AVERAGE	1008 / 2.48	179 / 0.44	1187 / 2.92

Total motorized route miles include all roads, motorized trails and unauthorized routes in each analysis unit (Gott 2010)

Another factor that is relevant to the affected environment is the prevalence of NFTS roads, trails and unauthorized routes crossing streams (called ‘stream crossings’ or ‘crossings’). Crossings are locations where the route may be hydrologically connected to the drainage network. This may result in a risk of contributing sediment directly to the drainage network, thus the number of crossings is a good indicator for potential effects to aquatic habitat. The numbers of stream crossings made by NFTS roads and trails, and unauthorized routes and the totals are displayed in Table 3- 212. These numbers include crossings of all stream orders.

Table 3- 212. Stream Crossing Numbers and Densities (NFTS Roads and Trails / Unauthorized Routes / Total) by Analysis Unit

Analysis Unit	NFTS Roads & Trails		Unauthorized Routes		Total	
	Number of crossings (#)	Crossing Density (# / mi ²)	Number of crossings (#)	Crossing Density (# / mi ²)	Number of crossings (#)	Crossing Density (# / mi ²)
SFM	717	6.5	134	1.2	851	7.7
WES	1,884	14.3	573	4.3	2,457	18.6
GLO	1,666	11.7	265	1.9	1,931	13.5
GAG	1,787	13.1	395	2.9	2,177	16.0
MAM	910	10.8	236	2.8	1,146	13.5
SSB	1,596	12.0	65	0.5	1,661	12.4
EKP	211	10.3	89	4.3	300	14.6
JCH	1,033	14.2	108	1.5	1,141	15.6
TAD*	1,687	9.6	406	2.3	2,093	11.9
DNK	3,125	13.0	223	0.9	3,348	13.9
TOTAL / AVERAGE	Total 14,611	Average 11.7	Total 2,494	Average 2.0	Total 17,105	Average 13.7

These include all potential crossings on perennial, intermittent and ephemeral streams and are over-estimates based on the knowledge that unscoured swales appear in the GIS layer as order 1 streams (Gott 2009)

Note that the crossing densities in WES and GAG are the highest, while densities in SFM are relatively low.

Cumulative Watershed Effects Analysis

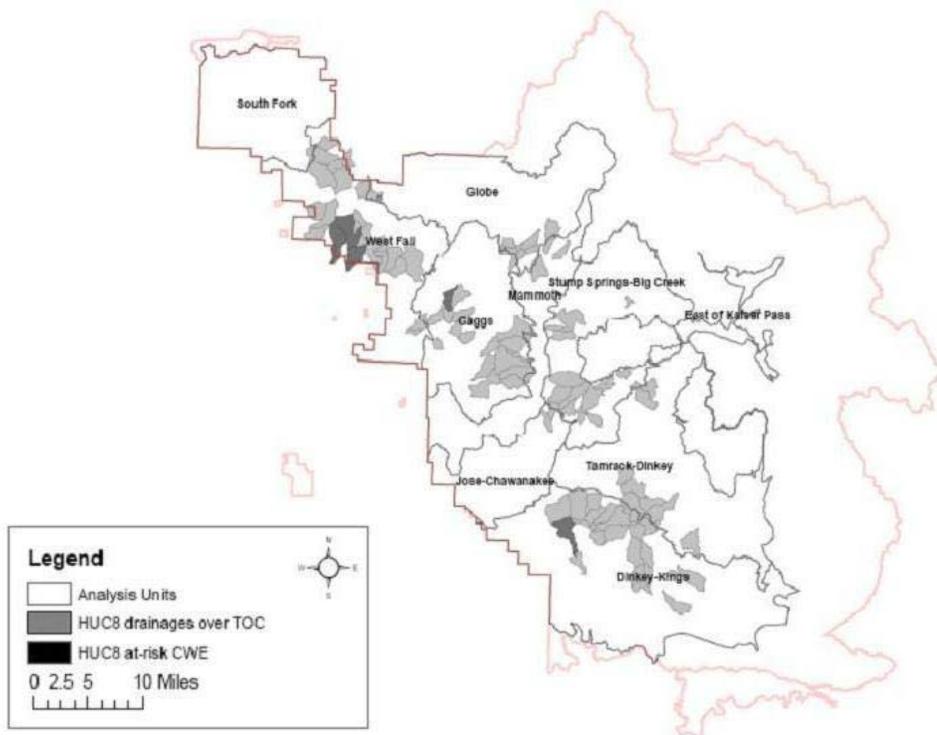
A cumulative watershed effects (CWE) assessment was conducted for the SNF Travel Management FEIS following the direction set forth in FSH 2509.22 (Gallegos 2009) to determine the potential for cumulative watershed effects in the affected watersheds in the proposed project area. A cumulative watershed effect would result in habitat degradation for aquatic/riparian species. The CWE model is based on a premise that watersheds will respond to effects of disturbance when that sub-watershed reaches a geomorphic and hydrologic threshold, referred to as the Threshold of Concern (TOC). CWEs from the proposed action or alternatives include potential changes in peak flows and/or increased sedimentation from accelerated erosion. An indicator of a cumulative watershed effect response could be one or more of the following: ERA values above the lower TOC value, excessive filling of channel pools with fine sediment; unstable channel banks; and/or poor aquatic habitat.

The project analysis units are located within 37 6th code Hydrologic Units (HUC6s). Each of these HUC basins is further divided into HUC7s and HUC8s. The Pacific Southwest Region is CWE was conducted at the HUC8 scale, which ranges from 200 to 2,900 acres in the project area. The analysis includes the routes currently occurring within the SNF, along with past, present and reasonably foreseeable actions. Within the analysis units there are 96 HUC8 subdrainages that currently exceed the identified lower TOC (Gallegos 2009). The TOC serves as an indicator for drainages that may either be incurring a Cumulative Watershed Effect (CWE) or have an elevated risk of triggering a CWE. The number of subdrainages and potentially affected acres are summarized by analysis unit in Table 3- 213 and displayed in Figure 3- 18.

Table 3- 213. Acres of HUC8 Drainage Exceeding TOC by Analysis Unit

Analysis Unit (AU)	Total Acres	Total Acres over TOC	% AU Over TOC
SFM	70545	470	0.67%
WES	84564	30328	35.86%
GLO	91210	6672	7.31%
GAG	87192	21500	24.66%
MAM	54133	3199	5.91%
SSB	85404	14825	17.36%
EKP	13123	0	0.0 %
JCH	46668	1159	2.48%
TAD	112649	11730	10.94%
DNK	154098	29489	19.14%
TOTALS	799,586	119,372	n/a

Figure 3- 18. Subdrainages exceeding Threshold of Concern (TOC) within the Analysis Units



Gallegos (2009) evaluated those HUC8 subdrainages exceeding TOC and summarized potential for a CWE to occur within 25 subdrainages most likely to express an effect or having special interest aquatic/riparian biota. The evaluation considered the TOC and current known information of channel stability within the subdrainage. Five HUC8s were identified having a high risk of a cumulative watershed effect. These HUC8s are 503.0052; 503.0053; 503.0054; 504.2251; and 519.3053.

Herpetofauna Surveys

The SNF has been conducting surveys for special interest herpetofauna since the early 1990s. Spot surveys were conducted within the Forest by Canorus Ltd. during 1993 and 1994 (Martin 1995). Other surveys have been conducted by the California Academy of Sciences (1999-2000) and by contractors for Pacific Gas and Electric and Southern California Edison during the late 1990s through present as part of the relicensing and post-license studies conducted for hydroelectric projects. The majority of the surveys were conducted by Forest Service personnel (1990-current) during NEPA analysis for specific projects and as part of the forestwide surveys for Yosemite toad under the Sierra Nevada Forest Plan Amendment (USDA-FS 2001, 2004a). Forest Service surveys were done implementing the Fellers and Freel (1995) survey methodology. Portions of the Forest remain incompletely surveyed due to challenging topography, remote access or apparent limited habitat.

3.14.3 Aquatic Biota Affected Environment and Environmental Consequences

Effects Common to all Aquatic Wildlife

Direct and Indirect Effects

Increasing popularity in motor vehicle use has resulted in the creation of unauthorized routes within the SNF. The proliferation of motorized routes across the SNF is accompanied by an increase of potential effects to aquatic/riparian biota. Some reptiles and amphibians (herpetofauna) have biphasic movement patterns associated with breeding or over-wintering sites. Species may be characterized as slow moving, small and inconspicuous making them vulnerable to traffic on roads or routes. Effects to aquatic/riparian species are more confined within the landscape to stream networks and associated riparian habitat. The effects from roads on species and habitat is well documented, including transport of water and sediment (Trombulak and Frissell 2000); alteration of peak flows (Jones et al. 2000); traffic residues (metals, oil and grease); and enhancing spread of non-native species (Trombulak and Frissell 2000). Studies of effects from routes are more limited. Where site specific information or literature on road and trail associated factors to aquatic species is unavailable, general information on potential impacts is presented. General direct and indirect effects of motorized use on wildlife were summarized by Trombulak and Frissell (2000) as: 1) human-caused mortality, 2) changes in behavior and 3) habitat modification. Additional information on the effects to the aquatic environment is presented in Soil and Watershed Resources sections.

Human-Caused Mortality: Allowing cross-country travel or adding new routes to the NFTS could continue to result in human-caused mortality to aquatic/riparian species in a variety of ways including:

- Collisions,
- Introduction of toxins,
- Introduction of non-native species, parasites or disease vectors.

Slow moving species (such as reptiles and amphibians) are more susceptible to road mortality because their life histories often involve migration between wetland and upland habitats (Trombulak and Frissell 2000, USDA FS1998). Linear features, such as roads and routes, represent both physical barriers as well as sites of direct mortality. Collisions with vehicles have been documented in numerous different aquatic and riparian dependant species and they may

even be particularly vulnerable to it (Trombulak and Frissell 2000). Literature suggests that highest road-kill rates are near wetlands and that amphibians represent the largest percent of species. Mass mortalities of species of frogs have been documented during dispersal where roads intersect natal/breeding habitat and non-breeding foraging habitat (Hine et al. 1981, Fahrig et al. 1995). Some frogs and toads disperse at night due to lower temperatures and increased relative humidity. Mazerolle (2003) reported that over an 8-year period, nearly 70 percent of amphibians observed on roads during night surveys were vehicle mortalities, while Ashley and Robinson (1996) reported 92 percent of identified road-kills as amphibians in a similar study. Mortality from vehicles can reduce population size and reduce movement between resources and conspecific populations (Fahrig et al. 1995; Carr and Fahrig 2001). Bury (1977) reported declines in individuals, diversity, density and biomass related to areas of motor vehicle use. Bury and Luckenbach (2002) identified nearly four times greater number of desert tortoise and active burrows in areas not subject to motor vehicle use compared to areas of use.

Stream crossings are also areas of concern for collisions. Although some stream crossings have culverts or bridges, fords or low-water crossings are more typical along unauthorized routes and may represent migration barriers (Furniss et al. 1991; Wellman et al. 2000). Locations of fords vary widely, but often occur along a relatively low gradient stretch of stream. When a ford is created in these areas, it often creates a small widened pool where different life history stages (fingerling fish or tadpoles) of some species may congregate. Increased densities of these species in the ford crossing pools may result in higher rates of collisions. Although some stages of species may be more prone to crushing at crossings, numerous herpetofauna (reptiles and amphibians) species disperse from aquatic to terrestrial habitats (i.e. Riparian Conservation Areas) as part of their life history. Herpetofauna species tend to be slow-moving and may migrate across a motorized route to access habitat. Slower dispersal movements can result in having a relatively higher risk of being crushed by vehicles. Aquatic and riparian dependant species are even more vulnerable to motor vehicle travel because routes may be influencing aquatic as well as terrestrial habitats. Based on observations of toads associated with pools at crossings by motor vehicle routes, Warburton et al. (2004) hypothesized that tadpole survivorship was poor at these habitat-route intersections.

Spellerberg and Morrison (1998) identify elements such as lead, nitrogen, cadmium and zinc as residue from petroleum products and tires. Introduction of toxins, non-native organisms, parasites and disease vectors are the final ways which motorized travel management may result in human-caused mortality. When vehicles travel along a route near a stream or cross a stream at a ford, small amounts of toxins such as oil, rubber, or gasoline may be introduced to the environment. Havlik (2002) projected over 10,000,000 gallons of gasoline and motor oil enters the soils and waters of public land annually from inefficient combustion of ATV engines. Although there is a low risk that individuals will be exposed to lethal levels of any of these toxins, small exposures may elicit immune responses within individuals. McCallum and Trauth (2007) found that male northern cricket frogs that elicited immune responses had reduced fertility rates. Mahaney (1994) noted that concentrations of crankcase oil of 100 mg/l inhibited tadpole growth and prevented metamorphosis. Therefore, introduction of toxins at low levels may result in reduced reproductive fitness of some aquatic species.

The movement and introduction of non-native organisms, parasites and disease vectors between water bodies has been recognized as a significant threat to numerous aquatic species. When traveling roads or trails throughout the course of a day, a vehicle may cross numerous streams or wet areas (i.e. springs, meadows). When a vehicle crosses a stream through a low-water crossing or a ford it may capture soil/debris in the tread of the tires or on the body of the vehicle. Non-native organisms, parasites and disease vectors may be captured in the soil/debris on the vehicle. When crossing subsequent streams or wet area, soil/debris may then be deposited potentially

spreading non-native organisms, parasites and disease vectors between water bodies. The risk of adverse effects to individuals and populations is highly variable among species.

Changes in Behavior: Although it is not well documented in the literature, it is reasonable to assume that aquatic species may be affected by motor vehicles through changes in behavior. Examples of changes in behavior include:

- predator avoidance
- changes in breeding behavior
- changes in energy budget

Travel management may result in increased access of vehicles and human visitors to aquatic species habitat. As with individuals of terrestrial species, individuals of aquatic species are likely to exhibit a predator avoidance response when they become disturbed by humans. Direct effects of disturbance to an individual's fitness are commonly measured through increases in stress hormone levels. Significant increases in stress hormone levels have been found to reduce reproductive success of individuals of some species.

Changes in breeding behavior for some amphibians have also been observed. Brattstrom and Bondello (1983) found that Couch's spadefoot toad responded to noises at auditory levels similar to an OHV. When vehicles drove near the toad habitat a response to the vibrations, which are similar to the noises that occur during thunderstorms associated with the species breeding cycle, subjected animals to absence of water for breeding; environmental conditions not typically experienced during breeding periods; depletion from energy due to emergence; predators; and interference with breeding success. Fahrig et al. (1995) note effects from traffic on local frog and toad breeding chorus, with population density related to traffic density. On the SNF, Kaiser Pass Meadow is located within 100 feet of a NFTS road. Karlstrom (1962) noted that the approach of a car or truck half a mile distant caused Yosemite toads to cease calling abruptly and did not resume calling until several minutes after the sound of the vehicle was completely gone to human ears. Roadside populations showed reduction in reproductive efficiency as the water-logged ground in a meadow readily transmits vibrations (Karlstrom 1962; Grinnell and Storer 1924). Recent studies (Liang 2009; Martin 2009) indicate that adult toad dispersal to breeding sites, from breeding sites to foraging habitat, and from foraging to over-wintering sites may involve movements over longer distances than previously indicated. Possible effects to adult toads during dispersal remain a consideration for confirmed breeding sites.

Indirect effects of disturbance are commonly displayed through changes in an individual's time and energy budget. As a vehicle or human approaches an individual, the most obvious and common disturbance response is for that individual to avoid the threat and seek cover. After an individual exhibits the disturbance response, a period of time will elapse until that individual resumes pre-disturbance behavior. Since this change in an individual's time budget may result in less time feeding or resting, the disturbance may result in changes to the individual's energy budget. If an individual is repeatedly disturbed in an area, they may avoid the area, essentially being displaced from the habitat. Significant changes to an individual's energy budget or displacement from its habitat may result in impacts to the individual's fitness. Rodriguez-Prieto and Fernandez-Juricic (2005) found that increases in disturbance from human-visitation resulted in significant reductions in the use of stream banks by Iberian frogs. They further concluded that disturbance from recreational activities negatively affected Iberian frogs through spatial and temporal losses in resources. Additionally, Nash et al. (1970) reported that leopard frogs exposed to noise synonymous with motor vehicles remained immobilized for extended periods of time. Such behavior may make amphibians more vulnerable to individual road/route mortality or predators.

Habitat Modification: Habitat size, isolation and quality influence density and persistence of local populations. Travel management may result in numerous different impacts to aquatic/riparian species habitat quality and quantity such as habitat loss, habitat fragmentation or increased sedimentation to stream systems. Roads or routes could alter drainage patterns resulting in alteration of hydrologic regime and changes to aquatic habitat (Wemple et al. 1996). Jones and Grant (1996) reported increased peak flows from road densities of 2-3 km/km². Alterations to terrestrial habitat may include, but are not limited to: reductions in riparian vegetation cover, introductions of non-native plant species and impacts to meadow hydrology. Alterations to aquatic habitat may include, but are not limited to: reductions in shade, increased water temperatures, increased sedimentation, altered hydrology and geomorphology.

Alteration of habitat resulting from increasing road and route density results in fragmentation of habitat. Habitat fragmentation was identified as an important factor in amphibian declines (Blaustein et al. 1994). Negative effects from road density and isolation effects from the associated road network were described by Vos and Chardon (1998) as resulting in greater mortality of individuals and lower colonization rates. Bury et al. (1977) correlated severity of vegetation damage to intensity of motor vehicle use. Finally Reh and Seitz (1991) reported reduced heterozygosity within local populations resulting from separation by highways.

The transfer of sediment to streams and other water bodies at road crossings is a consequence of roads and trails. The surfaces of unpaved roads can route fine sediments to streams, lakes and wetlands, increasing turbidity of the water (Reid and Dunne 1984). Various studies have demonstrated that sediment delivery to stream channels in a forested environment is correlated to road surface type, physical characteristics of the adjacent areas (e.g., litter depth, coarse wood), soils (erodibility), the steepness of slope below the road and vehicle usage (Chin et al. 2004, Clinton and Vose 2003). The knowledge of the impact of increased sediment load on amphibians is limited (Gillespie 2002). However, the negative impacts of increased sediments on aquatic species, including fish, macroinvertebrates and periphyton, are well known (Power 1990, Newcombe and MacDonald 1991). High concentrations of suspended sediment may directly kill aquatic organisms and impair aquatic productivity (Newcombe and Jensen 1996). Egg survival may be impacted by roads and trails through increases in fine sediments. Increased sedimentation may also reduce availability of important food resources for tadpoles such as algae (Power 1990). Fine sediment deposits also tend to fill pools and smooth gravel beds, degrading habitats (Forman and Alexander 1998) and possibly the availability of oviposition sites or larval refugia (Welsh and Ollivier 1998). In addition, the consequences of past sedimentation are long term and cumulative and cannot be mitigated effectively (Hagans et al. 1986).

The effects are heightened if the sediments contain toxic materials (Maxell and Hokit 1999). At least five different general classes of chemicals are transferred into the environment from maintenance and use of roads: heavy metals, salt organic molecules, ozone and nutrients (Trombulak and Frissell 2000). The changes to water chemistry by road runoff may affect living organisms in several ways. For example, chemicals found in road de-icers may kill (Dougherty and Smith 2006) or displace frog life stages or they may be accumulated in plants as toxins which, in turn, can depress larval amphibian growth.

Roads can also influence both peak flows (floods) and debris flows (rapid movements of soil, sediment and large wood stream channels) two processes which have major influences on riparian vegetation (Jones et al. 2000) as well as aquatic and riparian patch dynamics critical to stream ecosystems (Pringle et al. 1988). Numerous frog species breed in streams which can be adversely affected by fluctuations in the frequency or magnitude of peak flows, thereby, adversely affecting recruitment.

Cumulative Effects

Appendix E provides a list and general description of past, present and reasonably foreseeable projects within the analysis units. A wide range of activities have occurred and continue to occur across the landscape, which in combination represent the potential to cumulatively effect individuals or habitat for aquatic/riparian species. These activities may occur across elevation ranges within the project area, thus could affect aquatic/riparian habitat in a similar manner and are presented as common to all species. Activities included in the analysis include transportation management; recreation and facilities; vegetation management (including fuels reduction); fire (prescribed and wildfire); range; special uses; and private property. If a species may be subject to unique effects, those will be presented separately under the potentially affected species. Potential effects attributed to the activity from literature are described; however it does not imply that effects described are presently taking place. The Forest Service applies measures to reduce the probability of these effects. Measures include incorporation of Forest standards and guidelines (USDA-FS 1991); Best Management Practices (BMPs) (USDA-FS 2000); site specific design features; and the development of project design features to reduce effects from an action. Each project is also evaluated for consistency with Riparian Conversation Objectives (USDA-FS 2001; 2004a). Cumulative effects on physical aquatic habitat from the listed activities have been evaluated under a Cumulative Watershed Effects Assessment (Gallegos 2009).

Transportation Management

A system of Federal, State and county highways has been developed to provide access to the SNF. There are approximately 2,400 miles of roads and motorized trails in the SNF Transportation System (NFTS). Additionally there are approximately 110 miles of private roads, 250 miles of State and county roads, 180 miles of National Forest Special Use Roads and various other roads for a total of approximately 3,000 roaded miles on the Forest. Roads are distributed at all elevations across the Forest, thus potentially affect most aquatic/riparian species. Over the last 10 years there have been approximately 10 miles of new roads constructed and approximately 10 miles of road decommissioned. New road construction may be necessary related to future vegetation management/fuels reduction projects such as the Kings River Experimental Watershed project; Sierra Nevada Adaptive Management Project; or Fish Camp Project among others.

Roads can affect habitat for aquatic/riparian species, result in direct mortality, serve as linear barriers to movement; modify animal behavior; alter the physical and chemical environments; serve as a conduit for non-native species; or fragment species habitat (Trombulak and Frissell 2000). Increasing road densities have been identified as contributing to declines of some species and aquatic habitat quality. Accelerated erosion results from new construction (Reid and Dunne 1984). Road excavation can disrupt sub-surface water transport, bringing water to the surface where flow is concentrated and velocities are much higher. Roads can also collect water and serve as an extension of the stream network, thus altering runoff and peak flows. Road crossings can serve as migration barrier to movement of aquatic species (Furniss et al. 1991) and serve as sites to introduce sediment or pollutants.

Effects from accelerated erosion are mitigated by location of new roads away from sites where sediment would be transported to a stream channel; design drainage features such as out-sloping or rolling dips; or placement of gravel along segments where native surfaces might erode into stream channels. Best Management Practices (USDA-FS 2000) are implemented to reduce effects from roads (Appendix H).

Recreation and Facilities

Within the project area there are about 100 developed campgrounds and day use sites, other developed sites (boat launches, trailheads, etc), 59 managed Open Areas, parking, and staging areas, about 100 miles of motorized trails, and about 500 miles of non-wilderness hiking, cross-country skiing, and /or snowmobiling trails (note; these may overlap) currently included in the NFTS (USDA-FS 2006c). Recreation activities include (but are not limited to) hiking, camping, picnicking, fishing, fitness exercise, motorized recreation, swimming, boating, snow activities, horse use, scenery viewing, tourism, etc. Recreation projects mostly consist of rehabilitation of current facilities to update them to current universal accessibility standards. Some recreation projects include reconstruction or reroute of an existing motorized or non-motorized trail. The only possible new trails in the reasonably foreseeable future are associated with FERC projects or the San Joaquin River Trail project.

Recreation activities include use of motor vehicles and dispersed camping. These activities have the potential to affect aquatic/riparian habitat through changes in hydrologic regime; site compaction; sediment contribution; loss of vegetation; reductions in species density; or direct mortality (Bury et al. 1977). Amphibians and reptile species adjacent to campgrounds may be subject to handling; collection; consumption; or translocation (Maxwell and Hokit 1999). Handling may harm animals or in some instances handlers. Increased mortality rates may result from pets accompanying recreationists, along with increases in predators seeking refuse associated with recreational sites. Recreationists may unwittingly transport viruses, pathogens, non-native species or other pests through their movements, resulting in impacts to native biota.

Routes are currently being evaluated for developing a Travel Management Plan that would result in reduction of effects to aquatic/riparian species and habitat. Being considered are cessation of cross-country travel by motor vehicles; and adjustments to the season of use. Some approved routes would require improvements to protect resources.

Vegetation Management (including fuels projects)

Appendix E indicates over 525,000 acres of past timber harvesting and vegetation treatment. The acreage is subject to double counting, with some of the same acres having multiple treatments (planting and follow-up thinning) contributing to the overall total. The Forest estimates a timber harvest program of approximately 5-15 MBF (million board-feet) annually for the next 10 years. Currently an average of 2500 acres (at 3.5 MBF/acre) are harvested annually, which may increase to 5000 acres (at 3 MBF/acres) annually for the next 10 years. Harvest prescriptions in the past varied from clearcutting to understory thinning, however clearcutting has not been utilized on the SNF since 2001 (60 acres). Future vegetation/fuels reduction projects may include the Kings River Experimental Watershed project; the Sierra Nevada Adaptive Management Project; and Fish Camp among others.

Stream flow may increase as basal area (and evapotranspiration) declines and peak flows can be indirectly affected by vegetation removal (Chamberlin et al.1991; Kattleman 1996). Troendle (2001) indicated increased water yields following timber harvest, although treatments were primarily clearcuts rather than thinnings, which most current and planned projects implement. In snow-dominated areas, nearly all of the change in flows would occur during spring runoff and spring runoff may occur slightly sooner if reductions in canopy allow faster melting of the snowpack. Such changes could affect habitat for aquatic riparian species.

Individual timber/vegetation removal projects have prescribed Streamside Management Zones (SMZs) which provide buffering from upland activities, providing protection to aquatic systems and riparian habitat along streams. Under the Sierra Nevada Forest Plan Amendment (USDA-FS 2001; 2004a) Riparian Objective Consistency Analysis is prepared to evaluate whether project

design features provide for aquatic/riparian habitat and species. Other applicable measures include implementation of Best Management Practices (USDA-FS 2000) as part of the project design.

Fire (underburning, suppression and rehabilitation)

Appendix E indicates there have been 40,000 acres of wildfire and 22,000 acres of underburning within the project area. Wildfire, underburning and associated suppression and rehabilitation measures sometimes require the creation of temporary roads and fuel breaks that in the past have been used by the public and resulted in unauthorized routes on the forest. Aerial retardant may be applied to slow the spread or intensity of wildfire. Following fire suppression actions temporary access routes are rehabilitated and closed to motorized travel. Other actions may occur as part of the Burned Area Emergency Rehabilitation (BAER) to protect property and resources.

Wildfires influence aquatic ecosystems both directly and indirectly. Direct effects include heating or abrupt changes in water chemistry (Minshall et al. 1989; McMahon and de Calesta 1990). Indirect effects include changes in hydrologic regime, erosion, debris flows, woody debris loading and riparian cover (Brown 1989; Megahan 1991). Riparian areas differ from upland areas in topography, microclimate, geomorphology and vegetation. Further they are characterized as having cooler air temperatures, lower daily maximum air temperatures and higher relative humidity. These characteristics may contribute to higher moisture content of live and dead fuels and riparian soils, which presumably lowers the intensity, severity and frequency of fire (Dwire and Kauffman 2003). The ecological diversity of riparian corridors is maintained by natural disturbance regimes including fire and fire-related flooding, debris flows and landslides (Dwire and Kauffman 2003). Many species have adapted life histories that are shaped by and may depend on disturbance events (Dunham et al. 2003; Bisson et al 2003; Rieman et al 2005).

Fire suppression includes a resource officer for a wildfire incident. Part of the role of the resource officer is to identify known sites for threatened, endangered, proposed or sensitive species and provide protective measures to the extent possible. When Federally-listed species are affected by wildfire, emergency consultation is required. Following the fire, emergency rehabilitation may occur. Restorative actions implement BMPs (USDA-FS 2000) as part of project.

Range

Grazing allotments are authorized in most of the project area. Presently there are 28 active allotments, 17 vacant allotments. There are approximately 17,000 animal unit months (AUMs) of grazing permitted in the project area. Actual use differs annually depending on economics, weather conditions, market conditions, etc.

Cattle grazing can alter channel function, which reduces natural processes, habitat diversity and habitat complexity for aquatic or riparian animals (Elmore and Beschta 1987; Clary and Webster 1989; EPA 1991; Meehan et al. 1991; Belsky et al. 1999). Grazing can affect water quantity by changing the pattern and timing of runoff, as well as increasing sediment loads through removal of riparian vegetative cover and by trampling of streambanks. Hydrologic alteration can result in changes to channel morphology, resulting in channel downcutting, over-widening and lowering of the water table. Animal wastes can directly impair water quality through bacterial contamination and increasing nutrient levels (EPA 1991). Additionally, movement of cattle within riparian zones can lead to reductions in stream shading, compaction of stream banks and trampling of stream banks (Meehan et al. 1991; Armour et al. 1994). All of these factors can result in negative effects to habitat for aquatic/riparian species.

Forest Service standards and guidelines, along with BMPs (USDA-FS 2000) and utilization standards have been developed to improve rangeland condition, reduce effects and protect aquatic

systems. Individual range management projects include installing cattle guards and fencing, etc. Administration of cattle allotment permits (implementation of actions to protect sensitive habitat and species, etc) can aid in the restoration of riparian area and other habitat.

Special Uses

The Forest has approximately 1200 special-use authorizations (permits). These include, but are not limited to: Federal Energy Regulatory Commission (FERC) hydropower licenses, apiaries, water systems, private driveways, municipal utilities, recreational residences, communications sites, recreation resorts, camps and residences, a ski resort, outfitters and guides and miscellaneous other permits. Most of these permits are geographically stationary and include permanent facilities and infrastructure. They are located across the project area, with some permits clustered in groups adjacent to the hydropower reservoirs. The longest term authorizations are for 50 years (FERC licenses) and the shortest term is one year or less. Most permits where a road access is included are issued for 10 to 20 year terms. All authorizations are issued with specific terms and conditions.

Aquatic/riparian habitat can be greatly affected by FERC projects in particular. Most projects require the damming of perennial streams to create a reservoir, accompanied by stream bypass diversion of water from the reservoir to a powerhouse. The projects may result in migration barriers; instream flows providing less habitat; alteration of sediment transport regimes; changes in magnitude and timing of flows; sudden ramping up or down of flow; channel encroachment by riparian vegetation; and changes to water temperatures. Some of these changes may provide more favorable conditions for non-native species. The Forest has more than 130 miles of bypassed reaches associated with FERC projects. The FERC projects have completed relicensing over the past decade. The new FERC licenses include terms and conditions provided by Forest to improve habitat and stream function within the bypass reaches and make them consistent with Forest standards and guidelines.

Private Lands

Because private landowners do not typically publish their long-term management plans, actions on private lands are difficult to analyze. Some new roads could be built on private lands, but are unlikely to be open to the public. Cross-country travel will likely continue across private land for general access, business and/or recreation needs. Timber production will continue on private lands and associated road construction (mostly temp roads) will likely occur, as will grazing and continued urbanization.

Timber harvesting and road development represent potential effects to aquatic/riparian habitat on adjacent or downstream Forest lands. Harvesting on private lands requires a Timber Harvest Plan (THP) that evaluates compliance with State and Federal rules and laws (CDF 2005). The Cumulative Watershed Effects portion of the THP evaluates water temperature effect and includes consideration of streamside canopy. The importance of near water vegetation is also evaluated under the biological assessment component of the THP. Design features for THPs exclude removal of trees that provide stream shading during the critical summer period.

Human Caused Mortality

Collection (museum specimens, food or pets) and fishing are other methods by which motorized routes may indirectly result in human-caused mortality. By allowing cross-country use or by adding routes to the NFTS, access may be improved to various aquatic species habitat that would otherwise be inaccessible. Since bodies of water (lakes, rivers or streams) are often destinations for numerous routes, allowing motorized access on these routes may result in increased amounts

of fishing and/or collection of numerous different herpetofauna species. Collection and handling of herpetofauna near recreational facilities could increase rates of mortality due to stress from handling or direct consumption. There could also be mortality associated with Open Areas, parking, and staging areas from pets or predators (ravens, skunks, raccoons, coyotes or foxes) that may occur at greater frequency at these sites due to refuse.

Cumulative Watershed Effects

A cumulative watershed effects (CWE) assessment was conducted for the SNF Travel Management FEIS following the direction set forth in FSH 2509.22 (Gallegos 2009). For more information on impacts to aquatic species analyzed in this document, refer to the Affected Environment section of this document.

Species

For amphibians, the species and habitat accounts below were summarized from Lannoo (2005) and CDFG (2005). Additional references are cited to address specific elements of the species and habitat accounts for all species below (Table 3- 214).

Table 3- 214. Special Status Aquatic Wildlife Species on the SNF Discussed Further in this Analysis

Common Name	Scientific Name	Status	Species or Habitat Located in Analysis Area
Invertebrates			
Aquatic Macroinvertebrate habitat	<i>Numerous Species</i>	MIS	Yes
Fish			
Lahontan Cutthroat Trout	<i>Oncorhynchus clarki henshawi</i>	T	Yes
Reptiles and Amphibians			
California Red-legged Frog	<i>Rana aurora draytonii</i>	T	Yes
Foothill Yellow-legged Frog	<i>Rana boylei</i>	S	Yes
Relictual Slender Salamander	<i>Batrachoseps relictus</i>	S	Yes
Mountain (Sierra Nevada) Yellow-legged Frog	<i>Rana (sierrae) muscosa</i>	S	Yes
Pacific Tree (Chorus) Frog habitat	<i>Pseudacris regilla</i>	MIS	Yes
Western Pond Turtle	<i>Clemmys marmorata</i>	S	Yes
Yosemite Toad	<i>Bufo canorus</i>	S	Yes

Lahontan Cutthroat Trout– Affected Environment

Species and Habitat Account

Prior to the 19th century, Lahontan cutthroat trout (LCT) occurred in eleven lacustrine populations occupying about 334,000 acres of lakes and an estimated 400 to 600 fluvial populations inhabiting more than 3,600 miles of streams (Gerstung 1986). LCT historically occurred in most cold waters of the Lahontan Basin including the Humboldt, Truckee, Carson,

Walker and Summit Lake/Quinn River drainages. The trout also occurred in Tahoe, Cascade, Fallen Leaf, Upper Twin, Lower Twin, Pyramid, Winnemucca, Summit, Donner, Walker and Independence lakes (Gerstung 1988). Native LCT are now extirpated from these lakes with the exception of Independence and Summit lakes (Behnke 1992). LCT has been extirpated from most of the western portion of its range in the Truckee, Carson and Walker river basins and from much of its historic range in the Humboldt basin (Gerstung 1988).

LCT currently exist in about 155 streams (10.7 percent of historic habitat) and 6 lakes or reservoirs (0.4 percent of historic habitat) in Nevada, California, Oregon and Utah. Many of the fluvial LCT populations occupy isolated stream segments of larger river systems with no opportunity for natural recolonization. Both lacustrine and fluvial forms are subject to unique high risk extinction factors (USDI-USFWS 1995). On the SNF, two populations of pure LCT presently inhabit approximately 1.6 miles in West Fork of Portuguese Creek (Madera county, GLO analysis unit) and one of its tributaries; and 1.89 miles along West Fork Cow Creek (Fresno county, TAD analysis unit). Although both populations are introduced and are outside of the historical range, they are considered important sources of trout for reintroductions and refuge populations until recovery of more populations within the historical range can be achieved.

The LCT was listed by the USFWS as "endangered" in 1970 (Federal Register Vol. 35, p. 13520) and subsequently reclassified as "threatened" in 1975 (Federal Register Vol. 40, p. 29864). Critical habitat has not been designated on the SNF (USDI-USFWS 1995); however the species is managed under the recovery plan (USDI – USFWS 1995), along with terms and conditions of two U.S. Fish & Wildlife Service Biological Opinions ((BO) 1-1-94F-44 and 1-1-95-F-42). Critical Aquatic Refuges were established in the occupied subdrainages. Since 1996, the two populations have been monitored every year for population abundance and periodically (every 2 to 5 years) for stream channel condition under the terms and conditions of the USFWS BO for cattle grazing and from the LRMP (USDA-FS 1991) monitoring requirements.

Optimal LCT habitat is characterized by 1 to 1 pool-riffle ratios; well vegetated stable stream banks; over 25 percent cover and relatively silt free rocky substrates. LCT inhabit areas with overhanging banks, vegetation, or woody debris. In-stream cover (brush, aquatic vegetation and rocks) is particularly important for juveniles (Gerstung 1988). LCT are unique since they can tolerate much higher alkalinities than other trout. Adult LCT can tolerate temperatures exceeding 80 degrees Fahrenheit (27 degrees Celsius) for short periods of time and seem to survive daily temperature fluctuations of 27 to 68 degrees Fahrenheit (14-20 degrees Celsius). LCT does best in waters with average maximum water temperature of less than 72 degrees Fahrenheit (22 degrees Celsius) and average water temperatures of 55 degrees Fahrenheit (13 degrees Celsius).

For the purposes of this analysis, the perennial stream channels within the two watersheds associated with the West Fork Portuguese Creek and West Fork Cow Creek Critical Aquatic Refuges (CARs) are considered habitat for this species. More specifically, the populations monitored under the BO for the LCT are defined as the stream reaches in West Fork (WF) Portuguese and West Fork (WF) Cow Creeks and the associated perennial tributaries within their two CARs. Affected habitat for this species is considered 200 ft on either side of stream order 2 and above (class 1, 2 and 3 streams) within the 2 CARs above the migration barrier.

Lahontan Cutthroat Trout– Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects (beneficial or adverse) to the Lahontan cutthroat trout (LCT) by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized routes, and/or Open Areas, parking, and staging areas) to the NFTS,
- Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 in Section 3.14.1), and
- Implementing project design features.

These actions may have direct and indirect effects on LCT through: increasing or decreasing human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). However, these fish may be less susceptible to motorized travel management because protected stream habitats have been established on the SNF and are monitored annually for population viability and habitat condition. These two fish populations are most susceptible to habitat modification, mainly in the form of excess sediment entering the stream channels. This degrades the quality of breeding habitat and potentially the reduction in the volume of pool habitat available (Cedarholm et al. 1981). A Programmatic Agreement (PA) (2006) with USFWS outlines Route Designation Project Design Criteria (PDC) for designating any routes to the NFTS within LCT habitat. For this analysis, the SNF will follow all PDC related to LCT for any proposed unauthorized routes and Open Areas, parking, and staging areas within the two CARs therefore further consultation with the USFWS would not be necessary for this species. If a proposed unauthorized route or Open Area does not meet the PDC for the LCT, it was not brought forward into an action alternative.

Indicators

Based upon the USFWS PA (2006), the following indicators were chosen to provide a relative measure of the direct and indirect effects to LCT. They provide general measures by which the effects of the project alternatives may be compared.

- Number of unauthorized routes within the WF Portuguese and WF Cow Creek Critical Aquatic Refuges (CARs).
- Miles of unauthorized routes for motor vehicle use within the WF Portuguese and WF Cow Creek CARs.
- Number of unauthorized routes that do not avoid Riparian Conservation Areas (RCAs) within the WF Portuguese and WF Cow Creek CARs.
- Number of stream crossings on unauthorized routes within the WF Portuguese and WF Cow Creek CARs.
- Number of Open Areas, parking, and staging areas within the WF Portuguese and WF Cow Creek Critical CARs.

- Acres of Open Areas, parking, and staging areas open for motor vehicle use within the WF Portuguese and WF Cow Creek CARs.
- Percentage of habitat directly impacted by unauthorized routes or Open Areas, parking, and staging areas added to the NFTS.
- Number of NFTS roads with a year-round closure proposed for a season of use change within the WF Portuguese and WF Cow Creek CARs.
- Miles of NFTS roads with a year-round closure proposed for a season of use change within the WF Portuguese and WF Cow Creek CARs.

Alternative 1 – No Action

Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative except within areas described closed in the 1977 ORV Plan (Figure 1-3). Approximately 75 percent of the WF Cow Creek CAR and 30 percent of the WF Portuguese Creek CAR are located within described areas prohibiting cross-country travel. For the purpose of this analysis, unauthorized route miles and Open Area acres (including those in prohibited cross-country travel areas) inventoried in 2005 were calculated to get an approximate base number of miles/areas that have been created as a result of cross-country travel (Table 3- 215). As an estimate of all use that has occurred since in the 1977 ORV Plan, there are 28 unauthorized routes (2.7 miles) that have been inventoried (2005) within the two CARs, 7 stream crossings and 19 Open Areas, parking, and staging areas (1.7 acres) (Table 3- 215). Thirteen of those unauthorized routes are located in prohibited to cross-country travel areas. Approximately 2,900 acres are open for cross-country travel within the CARs.

In the WF Cow Creek CAR the entire length of stream that is considered occupied and annually monitored for LCT is located within the area prohibited to cross-country travel. Under this alternative, cross-country travel would continue to be prohibited in this area, which should continue to have beneficial effects to the trout on this portion of the stream. Cross-country travel would be allowed in the lower end of the CAR where the species may occur, but is likely hybridized and not monitored under the USFWS BO. In the WF Portuguese Creek CAR, the segment of stream occupied with trout is completely outside of the area prohibited to cross-country travel and access to habitat by cross-country travel could occur. Continuing to allow cross-country travel in this area could have a negative effect on the trout and its habitat.

It is assumed that wheeled vehicles would continue to use all unauthorized routes inventoried, as well as continue to create new routes. The use of unauthorized routes and the continued proliferation of new routes would result in increasing the amount of direct and indirect effects to LCT. The short-term effects would not be expected to change, while continued proliferation of routes would be exacerbated over the long term.

Although written primarily for grazing activities, the existing Biological Opinion (BO) for the two CARs may add an additional protection measure to stream habitat within 200 feet of all tributaries to WF Portuguese and WF Cow Creeks (USDA-FS 2001; USDA-FS 2004a) which states “no motor vehicles are allowed off permanent roads”. This would help reduce some of the potential direct and indirect effects to LCT and its habitat in that limited area.

No road maintenance or improvement plans to any unauthorized routes or Open Areas, parking, and staging areas created would be applied under this alternative. Within the two CARs, vehicles would be free to access portions of the habitat outlined in the USFWS Programmatic Agreement (2006) Route Designation Project Design Criteria and would not be consistent with the Programmatic Agreement (2006). This alternative would not prohibit additional stream crossings, monitor sediment run-off or limit Open Areas, parking, and staging areas or unauthorized routes

to outside of RCA's within occupied subdrainages. It is assumed that additional unauthorized routes would be created which may increase the amount of sediment, increase the number of stream crossings and could possibly increase (angler) mortality in occupied habitats.

Additions to the NFTS: There are no unauthorized routes or Open Areas, parking, and staging identified to be added to the NFTS in Alternative 1.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no proposed changes to the current season of use NFTS. There are specific road closures outlined in the BO for the Lahontan cutthroat trout and are enforced in the current road closure plan. Closure conditions would not change therefore there should be no changes to potential direct and indirect effects to the LCT.

Project Design Features: There are no project design features implemented for this alternative because no changes are proposed to the NFTS.

Alternative 2 – Proposed Action

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited across the SNF in this alternative. Prohibition of cross-country travel would limit motor vehicle use to NFTS roads within the WF Portuguese and WF Cow Creek CARs (no unauthorized routes or Open Areas, parking, and staging areas were proposed for addition to the NFTS) (Table 3- 215). Prohibition of cross-country travel within the two CARs would eliminate approximately 2,900 acres open for use in Alternative 1 (outlined in Figure 1-3). This would reduce direct and indirect impacts to the watershed and the LCT. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to LCT from motorized travel over the short and long term.

Additions to the NFTS: Under this alternative, there are no unauthorized routes or Open Areas, parking, and staging areas proposed for addition to the NFTS within the LCT CARs (Table 3- 215). This would have a beneficial effect on the species by eliminating use on approximately 2.7 miles of unauthorized routes and 1.7 acres of Open Areas, parking, and staging areas currently accessed under Alternative 1 and allow for their recovery.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, 3 NFTS roads (1.7 miles) currently closed year-round are proposed to have a new seasonal closure date, but would not be open for vehicle travel until at least May 20th of each year (Table 3- 215). This wet weather closure should give adequate protection to native surface roads and minimize direct and indirect effects (i.e. sedimentation) to the LCT and habitat. In addition, roads in the WF Cow Creek CAR identified in the BO with a year-round closure date would not change.

Project Design Features: For this analysis, the USFWS PA Route Designation Project Design Criteria (2006) would be implemented on any unauthorized routes proposed and further consultation would not be necessary. No unauthorized routes or Open Areas, parking, and staging areas were proposed for addition to the NFTS within LCT CARs. Roads with a year-round closure proposed for a season of use change would need to be monitored for impacts to perennial streams associated with LCT within the CARs.

Alternative 3

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Additions to the NFTS: Under this alternative, there would be no new unauthorized routes or Open Areas, parking, and staging areas proposed for addition to the NFTS. Direct and indirect effects are the same as described in Alternative 2.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): No changes in seasonal use are proposed under this alternative. Direct and indirect effects would be the same as Alternative 1.

Project Design Features: There are no project design features to be implemented for this alternative because no unauthorized routes or Open Areas, parking, and staging areas would be proposed for addition to the NFTS.

Alternative 4

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Additions to the NFTS: Under this alternative, there are no unauthorized routes or Open Areas, parking, and staging areas proposed for addition to the NFTS within LCT CARs. Direct and indirect effects are the same as described in Alternative 2.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, 1 NFTS road (0.21 miles) currently closed year-round is proposed to have a new seasonal closure date, but would not be open for vehicle travel until at least May 20th of each year. Direct and indirect effects are the same as described in Alternative 2.

Project Design Features: No unauthorized routes or Open Areas, parking, and staging areas were proposed for addition to the NFTS within LCT CARs, therefore, there are no project design features to be implemented for this alternative.

Alternative 5

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Additions to the NFTS: Under this alternative, there are no unauthorized routes or Open Areas, parking, and staging areas proposed for addition to the NFTS within LCT CARs. Direct and indirect effects are the same as described in Alternative 2.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, 1 NFTS road (0.21 miles) currently closed year-round is proposed to have a new seasonal closure date, but would not be open for vehicle travel until at least May 20th of each year. Direct and indirect effects are the same as described in Alternative 2.

Project Design Features: There are no project design features to be implemented for this alternative because no unauthorized routes or Open Areas, parking, and staging areas would be proposed for addition to the NFTS within LCT CARs.

Table 3- 215. Direct and Indirect Effect Indicators for Alternative 1 through 5 for the Lahontan Cutthroat Trout

Lahontan cutthroat trout- Direct and Indirect Effects Indicators	Alt. 1 ¹	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of unauthorized routes within the WF Portuguese and WF Cow Creek CARs.	28	0	0	0	0
Miles of proposed unauthorized routes for motor vehicle use within the WF Portuguese and WF Cow Creek CARs	2.7	0	0	0	0
Number of unauthorized routes/Open Areas, parking, and staging areas that do not avoid Riparian Conservation Areas (RCAs) within the WF Portuguese and WF Cow Creek CARs.	20	0	0	0	0
Number of stream crossings on proposed unauthorized routes within the WF Portuguese and WF Cow Creek CARs.	7	0	0	0	0
Number of Open Areas, parking, and staging areas within the WF Portuguese and WF Cow Creek CARs.	19	0	0	0	0
Acres of proposed Open Areas, parking, and staging areas open for motor vehicle use within the WF Portuguese and WF Cow Creek CARs.	1.7	0	0	0	0
Percentage of habitat directly impacted by unauthorized routes/Open Areas, parking, and staging areas added to the NFTS	0.15 %	0 %	0 %	0 %	0 %
Number of NFTS roads with a year-round closure proposed for a season of use change within the WF Portuguese and WF Cow Creek CARs.	0	3	0	1	1
Miles of NFTS roads with a year-round closure proposed for a season of use change within the WF Portuguese and WF Cow Creek CARs.	0	1.7	0	0.2	0.15

¹ Alternative 1 is calculated as an estimate of the total number and miles of unauthorized routes / acres of Open Areas, parking, and staging areas that have been inventoried (2005) in cross-country travel areas (including areas closed to cross-country (Figure 1-3)) in order to display a comparison between alternatives.

Cumulative Effects Unique to this Species

There are no subwatersheds over the upper Threshold of Concern (TOC) within this species range. Therefore there are no cumulative effects unique to this species. See Cumulative Effects discussion under Effects Common to All Aquatic Wildlife in this section.

Summary of Effects Analysis across All Alternatives

Lahontan cutthroat trout currently occupy two HUC8 subdrainages within the project area. Direct, indirect and cumulative effects from **Alternatives 2, 3, 4 and 5** will not affect the LCT or its habitat. (*No Effect*). **Alternative 1** would have the highest probability of negative affects in the West Fork Portuguese Creek CAR; a beneficial impact in the West Fork Cow Creek CAR; and overall *may affect but is not likely to adversely affect* the LCT or its habitat. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record.

California Red-legged Frog – Affected Environment

Species and Habitat Account

Historically, the California Red-legged frog (CRLF) was common in coastal habitats from the vicinity of Point Reyes National Seashore, Marin County, California and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985). However, the taxon is now extirpated from 24 of these locations (USDI-USFWS 1996) and has been eliminated from 95 percent of its historic range (Jennings and Hayes 1994).

Currently only three documented populations are known to remain in the Sierra Nevada (USDI-USFWS 2002). None of these populations occur within the SNF boundary or are within 1.6 km (1 mi) of the SNF (California Natural Diversity Database (CNDDDB)). The nearest population location to the SNF is at Young's Creek in Calaveras County, approximately 60 air miles northwest from the SNF boundary (CNDDDB 2008). The closest historic records of CRLF sighting are to the west of the SNF boundary at: Willow Creek (near O'Neals, 1952- private property); the San Joaquin Experimental Range; and Miami Creek (private property). CRLF are considered to be extirpated from these areas adjacent to the SNF, probably since the late 1960s according to herpetology expert Mark Jennings (per. comm.).

The SNF is a part of the recovery unit "Sierra Nevada Foothill and Central Valley". However, the SNF was not listed as critical habitat for the species in 2001 or 2004 critical habitat designations (66 FR 14625 and 69 FR 19619) nor were any recovery elements established for the species on the SNF in the 2002 species recovery plan (67 FR 57830; USDI-USFWS 2002).

Many of the streams with potential habitat (low gradient (≤ 4 percent) perennial streams and ponds under 5000 feet elevation) across the SNF have had habitat assessments (USDI - USFWS 1997; 2005) completed and were considered non-habitat or marginal habitat for a variety of reasons. Widespread herpetological surveys throughout the Forest have been conducted on these stream channels since 1992 with no detections of the species, although most surveys did not include night visits which have been demonstrated to improve detection (Fellers and Kleeman 2006). Although there have not been any observations of the CRLF on the forest or in the project area, all suitable habitat has not been surveyed within the last two years to the most recent protocol (USDI-USFWS 2005). Therefore, this analysis assumes that suitable habitat is occupied.

The CRLF is a highly aquatic species typically found in cold-water ponds, relatively flat (< 4 percent slope) streams, with pools depths exceeding 0.7 meters (2.3 feet) and with overhanging vegetation such as willows, as well as emergent and submergent vegetation (Hayes and Jennings 1988, USDI-USFWS 2002). It is generally found in or near water, but does disperse away from water after rain storms (Martin 1992), although Alvarez (2004) reported CRLF utilizing cracks in the bottom of dried ponds.

Potential suitable breeding habitat for this species was evaluated as streams that had been identified and based on the habitat assessment, met minimal criteria for the breeding habitat. These streams included perennial streams with ≤ 4 percent slope, 0.7 meters (2.3 feet) in depth for pools and did not have annual scour, as well as ponds and lakes below 5,000 feet in elevation with a 300 foot dispersal area (USDI – USFWS 2002) on either side of the stream or around the ponds and lakes. This analysis assumes that suitable habitat is occupied.

California Red-legged Frog – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects (beneficial or adverse) to the California red-legged frog (CRLF) by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized routes, and/or Open Areas, parking, and staging areas) to the NFTS,
- Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 in Section 3.14.1), and
- Implementing project design features.

These actions may have direct and indirect effects on CRLFs through: increasing or decreasing human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). Furthermore, these frogs may be susceptible to effects from motorized travel management because they utilize upland habitats, frequently considerable distances from aquatic features. Bulger et al. (2003) and Fellers and Kleeman (2006) reported terrestrial movements up to 1.7 miles before and after the breeding period as adults dispersed into other non-breeding aquatic habitats. Fellers and Kleeman (2006) also reported that a large portion of the population (35 percent) can move during single rainfall events and a majority of all frogs in a population migrate during the breeding season. The CRLF can also move in excess of 150 yards from aquatic habitat to seek cover in upland habitats and remain for up to 3 weeks (Bobzien and DiDonato 2007).

Indicators

Based upon the available literature and the Programmatic Agreement (PA) with US Fish and Wildlife Service (2006), the following indicators were chosen to provide a relative measure of the direct and indirect effects to the CRLF. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Number of unauthorized routes within the 300 feet of potential suitable breeding habitat.
- Miles of unauthorized routes proposed for motor vehicle use within 300 feet of potential suitable breeding habitat.
- Number of unauthorized routes that have the potential to capture surface run-off and then deliver sediment into a stream associated with potential suitable breeding habitat.
- Number of stream crossings on proposed unauthorized routes within 300 feet of potential suitable breeding habitat.
- Number of perennial stream crossings on proposed unauthorized routes that crosses potential suitable breeding habitat.

- Number of unauthorized routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams.
- Number of Open Areas, parking, and staging areas open for motor vehicle use within 300 feet of potential suitable breeding habitat.
- Acres of Open Areas, parking, and staging areas open for motor vehicle use within 300 feet of potential suitable breeding habitat.
- Percentage of habitat directly impacted by unauthorized routes and Open Areas, parking, and staging areas added to the NFTS.
- Number of NFTS roads with a year-round closure proposed for a season of use change within 300 feet of potential suitable breeding habitat
- Miles of NFTS roads with a year-round closure proposed for a season of use change within 300 feet of potential suitable breeding habitat

Alternative 1 – No Action

Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1-3). For the purpose of this analysis, route miles and Open Area acres (including those inventoried in prohibited cross-country travel areas) inventoried (2005) were calculated to get an approximate base number of miles/areas that have been created as a result of cross-country travel. Within 300 feet of CRLF potential suitable breeding habitat, approximately 89 unauthorized routes (7.2 miles), 51 stream crossings (0 cross potential suitable habitat) and 107 Open Areas, parking, and staging areas (8.6 acres) have been inventoried (Table 3- 216). No unauthorized routes or Open Areas, parking or staging areas are located in areas prohibiting cross-country travel shown in Figure 1-3. There are approximately 8,006 acres of potential suitable breeding habitat located in the project area.

It is assumed that wheeled vehicles would continue to use all unauthorized routes, as well as potentially continue to create new routes within the 8,006 acres of suitable breeding habitat in the project area. The use of unauthorized routes and the continued proliferation of new routes would increase both direct and indirect effects to CRLF individuals and habitat. No road maintenance or improvement plans for any unauthorized routes or Open Areas, parking, and staging areas created would also add to increasing direct and indirect effects to the CRLF and its habitat over the long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term. Currently the potential for direct effects such as crushing or injuring CRLF from vehicles traveling on inventoried (2005) unauthorized routes located within potential suitable CRLF breeding habitat affect accounts for less than 1 percent of the suitable habitat analyzed (Table 3- 216).

This alternative would not be consistent with the USFWS Programmatic Agreement (2006) and would require additional consultation to determine effects on habitat and the CRLF.

Additions to the NFTS: There are no unauthorized routes or Open Areas, parking, and staging areas identified to add to the NFTS in Alternative 1, however, use of existing inventoried unauthorized routes and Open Areas, parking and staging areas would continue.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no changes to the current season of use on NFTS roads.

Project Design Features: There are no project design features implemented for this alternative because no changes are proposed to the NFTS.

Alternative 2 – Proposed Action

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, and managed Open Areas, parking, and staging areas within CRLF potential suitable breeding habitat in the project area. This alternative would eliminate the potential use of approximately 8,006 acres from Alternative 1 of CRLF suitable breeding habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the CRLF individuals and habitat. Implementation of Alternative 2 would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to CRLF from motorized travel over the short and long term.

Additions to the NFTS: Under this alternative, there are no unauthorized routes or stream crossings within 300 feet of CRLF potential suitable breeding streams and no Open Areas, parking, and staging areas are proposed for addition to the NFTS within CRLF potential suitable breeding habitat (Table 3- 216).

This alternative would have a beneficial effect on the CRLF and its habitat by excluding approximately 7.2 miles (100 percent of total miles) of unauthorized routes from authorized use in potential suitable breeding habitat and allow for their natural recovery over the long term. Access to Open Areas, parking, and staging areas would be only those that are currently managed.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this Alternative, 1 NFTS road (0.02 miles) currently closed year-round within 300 feet of CRLF potential suitable breeding habitat is proposed for a new seasonal closure date (Table 3- 216), but would not be open for vehicle travel until at least April 20th of each year. A wet weather closure should reduce the potential of native surface road sediment run-off into associated CRLF habitat, reduce streambank disturbance at stream crossings and minimize direct and indirect effects to aquatic and terrestrial habitat. Closure of routes during the wet weather season would likely reduce disturbance to all life stages of the CRLF and habitat.

Project Design Features: No unauthorized routes or Open Areas, parking, and staging areas are proposed under this alternative; therefore, there would be no project design features to be implemented.

Alternative 3

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only NFTS roads (no additional unauthorized routes or Open Areas, parking, and staging areas are proposed). This would eliminate the potential use of approximately 8,006 acres of potential suitable breeding CRLF habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to all life stages of the CRLF.

This alternative would have a beneficial effect on the CRLF and its habitat by excluding approximately 7.2 miles (51 stream total crossings) of unauthorized routes from authorized use in potential suitable breeding habitat and allow for their natural recovery over the long term. Access to Open Areas, parking, and staging areas would be only those that are currently managed.

Additions to the NFTS: There would be no unauthorized routes or Open Areas, parking, and staging areas proposed to be added to the NFTS in Alternative 3.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no changes to the current season of use on NFTS roads.

Project Design Features: No unauthorized routes or Open Areas, parking, and staging area are proposed under this alternative; therefore, there would be no project design features to be implemented.

Alternative 4

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 1 proposed route and no Open Areas, parking, and staging areas within potential suitable breeding CRLF habitat in the project area. Direct and indirect effects are similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there is one unauthorized route (0.03 miles), one seasonal stream crossing (within Riparian Conservation Area adjacent to potential suitable breeding CRLF habitat) and no Open Areas, parking, and staging areas proposed for addition to the NFTS within CRLF potential suitable breeding habitat (Table 3- 216). This alternative would have beneficial effects by excluding use of approximately 7.17 miles (99.6 percent of total miles) of unauthorized routes within CRLF potential suitable breeding habitat and provide for natural recovery over the long term. Open Area, parking and staging area access would be limited to only those which are currently managed.

There is one proposed unauthorized route (BP111) analyzed for Route Designation Project Design Criteria consistency outlined in the USFWS Programmatic Agreement (2006):

- A portion of BP111 (0.03 miles) is located within 300 feet of potential suitable breeding habitat along the upper portion of South Fork Willow Creek. There is one perennial stream crossing along the route. This crossing flows into potential suitable breeding habitat. Field data collected notes: Runoff is channelized along road and delivered to stream at a single point - erosion in ditch contributes sediment to SF Willow Creek. Bringing this route up to Forest standard would meet the USFWS Programmatic Agreement (2006) for unauthorized routes with potential to capture surface run-off, however this route may not avoid Riparian Reserve and Riparian Conservation Areas except where necessary to cross streams since it ends at a gauging station at SF Willow Creek. Additional consultation with USFWS would be needed to add this route to the NFTS.

Since the stream crossing on BP111 is on a seasonal tributary to the creek identified as potential suitable breeding habitat, the crossing would not likely result in direct effects to individuals CRLF. Indirect effects to habitat (sedimentation) may occur, however, short-term effects of adding the proposed route to the NFTS could have a beneficial impact on CRLF habitat since this route would be brought up to Forest standards and maintained. This should reduce sediment, stabilize the stream crossing and would be consistent with the USFWS Programmatic Agreement for unauthorized routes within 300 feet of suitable breeding habitat.

There could be continued direct and indirect effects to CRLF individuals within dispersal areas of proposed route over the long term. The addition of this route would likely result in some direct effects to adult CRLF dispersing and result in indirect effects to both aquatic and terrestrial habitat over the short and long term.

Since there is a slight decrease in the number of unauthorized routes and no Open Areas, parking, and staging areas proposed to be added to the NFTS within potential suitable breeding CRLF

habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to CRLF within the project area over the short and long term. The proposed route would be located within potential suitable breeding habitat, but not known occupied habitat. CRLF may be affected; however, the potential for direct effects such as crushing or injuring CRLF from vehicles traveling only on proposed unauthorized routes located within potential suitable CRLF breeding habitat accounts for less than 1 percent of potential suitable breeding habitat analyzed (Table 3- 216).

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, 3 NFTS roads (0.23 miles) currently closed year-round that are within 300 feet of CRLF potential suitable breeding habitat are proposed for a new seasonal closure date, but would not be open for vehicle travel until at least April 20th of each year. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Design Features: Under this alternative, project design features on proposed unauthorized routes within potential suitable breeding habitat are: Stabilize road to eliminate sediment entering creek, install additional ditch relief pipes and possibility for reconstructing as out sloped road. For aquatic/riparian species design features on unauthorized routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record. For site specific aquatic/riparian species design features, refer to Appendix A of this document.

Alternative 5

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, three proposed unauthorized routes and two Open Areas, parking, and staging areas within potential suitable breeding CRLF habitat in the project area. Direct and indirect effects would be similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are three unauthorized routes (0.19 miles), one seasonal stream crossing (within RCA adjacent to potential suitable breeding CRLF habitat) and two Open Areas, parking, and staging areas (1.0 acres) proposed for addition to the NFTS within CRLF potential suitable breeding habitat (Table 3- 216). This alternative would have a beneficial effect by excluding use of approximately 7.01 miles (97.3 percent of total miles) of inventoried (2005) unauthorized routes within CRLF habitat and provide for natural recovery over the long term. Open Area access would be limited to two Open Areas, parking, and staging areas as well as those which are currently managed.

There are three proposed unauthorized routes (AE-23, BP111 and BP133) and two Open Areas, parking, and staging areas (BLUCYN4, BLUCYN6) analyzed for Route Designation Project Design Criteria consistency outlined in the USFWS Programmatic Agreement (2006). BP111 is discussed in Alternative 4.

1. AE-23 (0.16 miles) is located within 300 feet of potential suitable breeding habitat along Summit Creek. There are no seasonal stream crossings along the route. Field data collected notes: trail rutting, erosion present.

Bringing this route up to forest standard would meet the USFWS Programmatic Agreement (2006) for unauthorized routes with potential to capture surface run-off, however this route does not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCA) except where necessary to cross streams. Additional consultation with USFWS would be needed to add this route to the NFTS.

2. BP133 (0.03 miles) is located within 300 feet of potential suitable breeding habitat along Willow Creek. Only a very small portion enters potential suitable breeding habitat. No effects from this route are expected.
3. Open Areas, parking, and staging areas BLUCYN4, BLUCYN6 are located along opposite side of the streambanks of Summit Creek and are within 300 feet of potential suitable breeding habitat. Both areas are located inside of RR and RCAs, within CRLF potential suitable breeding habitat. Therefore, they are not consistent with the USFWS Programmatic Agreement (2006). Additional consultation with USFWS would be needed to add these Open Areas, parking, and staging areas to the NFTS.

Since there is a slight increase in the number of unauthorized routes and Open Areas, parking, and staging areas proposed to be added to the NFTS within potential suitable breeding habitat compared to Alternative 4, there would be an incremental increase in the direct and indirect effects to CRLF within the project area over the short and long term. Proposed unauthorized routes would be located within potential suitable breeding habitat, but not known occupied habitat. CRLF may be affected; however, the potential for direct effects such as crushing or injuring CRLF from vehicles traveling on proposed unauthorized routes or Open Areas, parking and staging areas located within potential suitable CRLF breeding habitat accounts for less than 1 percent of potential suitable breeding habitat analyzed (Table 3- 216).

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, 3 NFTS roads (0.23 miles) currently closed year-round that are within 300 feet of CRLF potential suitable breeding habitat are proposed for a new seasonal closure date (Table 3- 216), but would not be open for vehicle travel until at least April 20th of each year. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable CRLF habitat are outlined in Alternative 4 and also include installing drain dips with equipment. For aquatic/riparian species design features on unauthorized routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record. For site specific aquatic/riparian species design features, refer to Appendix A of this document.

Table 3- 216. Direct and Indirect Effect Indicators for Alternative 1 through 5 for the California Red-legged Frog

California Red-legged Frog - Direct and Indirect Effects Indicators	Alt. 1¹	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of unauthorized routes within 300 feet of potential suitable breeding habitat	89	0	0	1	3
Miles of unauthorized routes proposed for motor vehicle use within 300 feet of potential suitable breeding habitat	7.2	0	0	0.03	0.19
Number of unauthorized routes that have the potential to capture surface run-off and then deliver sediment into a stream associated with potential suitable breeding habitat	Up to 89	0	0	1	2
Number of stream crossings on proposed unauthorized routes within 300 feet of potential suitable breeding habitat.	51	0	0	1	1
Number of perennial stream crossings on proposed unauthorized routes that crosses potential suitable breeding habitat.	0	0	0	0	0
Number of unauthorized routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams.	Up to 87	0	0	1	1
Number of Open Areas, parking, and staging areas open for motor vehicle use within 300 feet of potential suitable breeding habitat	107	0	0	0	2
Acres of Open Areas, parking, and staging areas open for motor vehicle use within 300 feet of potential suitable breeding habitat	8.6	0	0	0	1.0
Percentage of habitat directly impacted by unauthorized routes/Open Areas, parking, and staging areas added to the NFTS.	0.19 %	0 %	0 %	0.004 %	0.01 %
Number of NFTS roads with a year-round closure proposed for a season of use change within 300 feet of potential suitable breeding habitat	0	1	0	3	3
Miles of NFTS roads with a year-round closure proposed for a season of use change within 300 feet of potential suitable breeding habitat	0	0.02	0	0.23	0.23

¹ Alternative 1 is calculated as an estimate of the total number and miles of unauthorized routes / acres of Open Areas, parking, and staging areas that have been inventoried (2005) in cross-country travel areas (including areas closed to cross-country (Figure 1-3)) in order to display a comparison between alternatives.

Cumulative Effects Unique to this Species

Cumulative impacts have likely contributed to the decline in CRLF numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the direct and indirect effects evaluated for CRLF and Effects Common to all Aquatic Wildlife discussion, there are 3 HUC8 subdrainages that were evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within these subdrainages, there are no unauthorized routes or Open Areas, parking, and staging areas inventoried intersecting the 179.9 acres of CRLF potential suitable breeding habitat. This represents 0 percent of potential suitable breeding habitat for CRLF subject to indirect affects related to unstable stream channels within these subdrainages.

Summary of Effects Analysis across All Alternatives

Historically, the California Red-legged frog (CRLF) was common in coastal habitats from the vicinity of Point Reyes National Seashore, Marin County, California and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985). The CRLF is not known to occur within the project area or on the SNF; however, protocol-level surveys have not been completed in potential suitable breeding habitat. Direct, indirect and cumulative effects from **Alternative 3** *will not affect* the CRLF or its habitat (*No Effect*). **Alternatives 4 and 5** *may affect but is not likely to adversely affect* the CRLF. Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to CRLF. **Alternative 1** *may affect but is not likely to adversely affect* the CRLF.

Additional consultation with USFWS would be needed for Alternative 1, unauthorized routes proposed under Alternative 4 and identified unauthorized routes and Open Areas, parking, and staging areas proposed in Alternative 5. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment (Barnes and Strand 2010) located in the project record.

The U.S. Fish and Wildlife concurred with the determination of “*not likely to adversely affect*” the CRLF for Alternatives 4 and 5 (letter # 81420-2009-I-1302-1 filed in the project record) and that “further consultation on Alternatives 2-5 is not necessary, unless new information reveals effects of the proposed action that may affect listed species in a manner or to an extent not considered; or the project is modified in a manner that causes an effect to the listed species that was not considered; or a new species or critical habitat is designated that may be affected by the proposed action (USDI -USFWS 2009).”

Foothill Yellow-legged Frog – Affected Environment

Species and Habitat Account

Historically, Foothill yellow-legged frogs (FYLF) occurred between sea level and 6,000 feet in most Pacific drainages west of the Sierra-Cascade crest from the Santiam River, Marion County Oregon, to the San Gabriel Drainage, Los Angeles County, California (Hayes and Jennings 1988). Jennings (1996) indicates that FYLF no longer occur within 45 percent of historic habitat in California and has disappeared from 66 percent of its historic habitat within the Sierra Nevada mountain range.

Currently there is only one known population of FYLF on the SNF (Jose Basin – San Joaquin drainage). The Museum of Vertebrate Zoology (Berkeley, California) indicates FYLF specimens collected from Big Creek (Mariposa country) in 1953, which could represent *Rana muscosa* due to elevation (5100 feet) and revisions in taxonomy in 1955 (both species were classified as FYLF prior to Zweifel’s revision). No other verified specimen from the forest has been collected since 1970. One time visual encounter surveys have been performed since the 1990s (primarily during

the hydro-relicensing projects) on several streams within the species elevation range without detections.

The Pacific Southwest Region of the Forest Service designated the FYLF as a sensitive species in 1998.

Foothill yellow-legged frogs are a highly aquatic species and prefer partial shade, shallow riffles and cobble sized or greater substrate (Hayes and Jennings 1986). Occasionally, this species is also found in other riparian habitats, including moderately vegetated backwaters, isolated pools (Hayes and Jennings 1986) and slow moving rivers with mud substrates. During the winter, FYLF have been observed in abandoned rodent burrows and under logs as far as 100 meters (328 feet) from a stream (Zeiner et al. 1988). The CWHR highly suitable habitats (CDFG 2005) for this species that occur within the SNF are riverine and valley foothill riparian with mostly submerged and flooded gravels, cobble, boulders and bedrock with trees greater than six inches in diameter and canopy closures greater than 10 percent.

For the purposes of this analysis, potential suitable habitat for the FYLF was evaluated as perennial (stream order 4 and greater) and intermittent (stream order 3) streams below 5,000 feet in elevation with a 165 foot dispersal area (CDFG 2005) on each side of the streams. Since aquatic species or habitat surveys were not conducted on all potential suitable habitats determined by GIS within the project area, a conservative approach was taken for suitable habitat available and suitable habitat was assumed occupied. General field data was collected on unauthorized routes and Open Areas, parking, and staging areas proposed in action alternatives to confirm suitable habitat.

Foothill Yellow-legged Frog – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects (beneficial or adverse) to the FYLF by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized routes and/or Open Areas, parking, and staging areas) to the NFTS,
- Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 in Section 3.14.1), and
- Implementing project design features.

These actions may have direct and indirect effects on FYLF through: increasing or decreasing human-caused mortality, changes in behavior and habitat modification (see Effects Common to all Aquatic Wildlife). These frogs may be less susceptible to motorized travel management because they are a highly aquatic species (Hayes and Jennings 1986), therefore, unauthorized routes within a RCA of suitable stream habitat would have less affect on these frogs than other more terrestrial aquatic/riparian species. The FYLF may however, be more vulnerable to affects of motorized travel management at stream crossings where suitable habitat is identified. The primary indirect effect from unauthorized routes is a reduction in the quantity and quality of habitat due to potential sediment.

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect affects to the FYLF and habitat. Biological thresholds for these indicators have not been established. However, these indicators provide general measures by which the effects of the project alternatives may be compared. Suitable stream habitats considered were perennial (stream order 4 and above) and intermittent (stream order 3) streams.

Occupied habitat:

- Number of stream crossings (perennial and intermittent) on unauthorized routes added to the NFTS within known occupied stream habitat.
- Number of unauthorized routes added to the NFTS within 165 feet of known occupied stream habitat.
- Miles of unauthorized routes added to the NFTS within 165 feet of known occupied stream habitat.
- Number of Open Areas, parking, and staging areas proposed to be added to the NFTS within 165 feet of known occupied stream habitat.
- Acres of Open Areas, parking, and staging areas proposed to be added to the NFTS within 165 feet of known occupied stream habitat

Suitable habitat:

- Number of unauthorized routes added to the NFTS within 165 feet of suitable stream habitat.
- Miles of unauthorized routes added to the NFTS within 165 feet of suitable stream habitat.
- Number of stream crossings (perennial and intermittent) on unauthorized routes added to the NFTS within 165 feet of suitable stream habitat.
- Number of Open Areas, parking, and staging areas proposed to be added to the NFTS within 165 feet of suitable stream habitat.
- Acres of Open Areas, parking, and staging areas proposed to be added to the NFTS within 165 feet of suitable stream habitat.
- Percentage of occupied/suitable habitat directly impacted by unauthorized routes and Open Areas, parking, and staging areas added to the NFTS.
- Number of NFTS roads with a year-round closure proposed for a season of use change within 165 feet suitable or occupied habitat.
- Miles of NFTS roads with a year-round closure proposed for a season of use change within 165 feet of suitable or occupied habitat.

Alternative 1 – No Action

Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1-3). About 45,980 acres of suitable FYLF habitat are located within the project area. Less than 1 percent of potential FYLF habitat is located within areas prohibited to cross-country travel shown in Figure 1-3. For the purpose of this analysis, unauthorized route miles and Open Area, parking and stages acres (including in prohibited cross-country travel areas) inventoried in 2005 were calculated to get an approximate base number of miles/areas that have been created as a result of cross-country travel.

Within 165 feet of suitable FYLF habitat, approximately 528 unauthorized routes (25.9 miles), 124 stream crossings (zero cross known occupied habitat) and 279 Open Areas, parking, and staging areas (20.3 acres) were inventoried (Table 3- 127). Only one route has been inventoried within a known occupied stream. Eleven unauthorized routes and nine Open Areas, parking, and staging areas are located in areas prohibiting cross-country travel shown in Figure 1-3.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and Open Areas, parking, and staging areas inventoried, as well as potentially continue to create new routes and Open Areas, parking, and staging areas within the approximate 45,980 acres of suitable habitat in the project area. This would result in increasing direct and indirect effects to FYLF individuals and habitat.

The use of unauthorized routes and the continued proliferation of new routes would increase both direct and indirect effects to FYLF individuals and habitat. No road maintenance or improvement plans for any unauthorized routes or Open Areas, parking, and staging areas created would also add to increasing direct and indirect effects to the FYLF and its habitat over the short and long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term.

Currently the potential for direct effects such as crushing or injuring FYLF from vehicles traveling on inventoried (2005) unauthorized routes and Open Areas, parking and staging areas located within occupied or suitable FYLF habitat accounts for than 1 percent of the habitat analyzed.

Additions to the NFTS: There are no unauthorized routes or Open Areas, parking, and staging areas identified to add to the NFTS in Alternative 1, however, use of existing inventoried (2005) unauthorized routes and Open Areas, parking and staging areas would continue.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no changes to the current season of use on NFTS roads.

Project Design Features: There are no project design features implemented for this alternative because no changes or additions are proposed to the NFTS.

Alternative 2 – Proposed Action

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 10 proposed unauthorized routes and 0 unmanaged Open Areas, parking, and staging areas within suitable FYLF habitat in the project area. There are no proposed unauthorized routes or Open Areas, parking, and staging areas within occupied habitat. This alternative would eliminate the potential use of approximately 45,980 acres from Alternative 1 of suitable/occupied FYLF habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the FYLF individuals and habitat. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to FYLF from motorized travel over the short and long term.

Additions to the NFTS: Under this alternative, there are 10 unauthorized routes (2.15 miles), 8 stream crossings and no Open Areas, parking, and staging areas proposed for addition to the NFTS within suitable FYLF habitat (Table 3- 217). No unauthorized routes or Open Areas, parking, and staging areas located within known occupied FYLF habitat are proposed. This alternative would have a beneficial effect to the FYLF by excluding the use of approximately 23.75 miles (91.6 percent of total miles) of inventoried (2005) unauthorized routes within FYLF suitable habitat and allow for natural recovery over the long term. Open Area access would be

limited to only those which are currently managed. Short-term effects of adding proposed unauthorized routes to the NFTS could have a beneficial effect on FYLF habitat since these routes would be brought up to Forest road standards and maintained. This should reduce sediment, stabilize stream crossings and improve habitat condition. There would be continued direct and indirect effects to FYLF individuals and suitable habitat along proposed unauthorized routes and Open Areas, parking, and staging areas over the long term. The addition of unauthorized routes would likely result in direct effects to all life stages of FYLF and result in indirect effects to both aquatic and terrestrial habitat over the short and long term.

Since there is a decrease in the number of unauthorized routes and Open Areas, parking, and staging areas proposed to be added to the NFTS within suitable FYLF habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. Proposed unauthorized routes would be located within suitable, but not known occupied habitat. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes located within FYLF occupied/suitable habitat accounts for less than 1 percent of the habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, 11 NFTS roads (4.4 miles) currently closed year-round that are within 165 feet of potential (suitable or occupied) FYLF habitat are proposed for a new seasonal closure date (Table 3- 217), but would not be open for vehicle travel until at least April 20th of each year. A wet weather closure should reduce the potential of native surface road sediment run-off into associated FYLF habitat, reduce streambank disturbance at stream crossings and minimize direct and indirect effects to aquatic and terrestrial habitat. Closure of routes during the wet weather season would likely reduce disturbance to all life stages of the FYLF and habitat.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable FYLF habitat include: stabilize stream crossing (i.e. hardening), drainage improvements to protect ephemeral streams from sedimentation and installation of ditch relief pipes. Implementation of these project design features may result in short-term disturbance to some individuals, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long term. For aquatic/riparian species design features on unauthorized routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record. For site specific aquatic/riparian species design features, refer to Appendix A of this document.

Alternative 3

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only NFTS roads. This would eliminate the potential use of approximately 45,980 acres of suitable FYLF habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the FYLF. Direct and indirect effects would be similar to those described in Alternative 2.

This alternative would have a beneficial effect on the FYLF and its habitat by excluding approximately 25.9 miles of inventoried (2005) unauthorized routes from use in suitable/occupied habitat and allow for their natural recovery over the long term. Open Areas, parking, and staging areas would be limited to only those that are currently managed.

Additions to the NFTS: There would be no unauthorized routes or Open Areas, parking, and staging areas proposed to be added to the NFTS.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no changes to the current season of use on NFTS roads.

Project Design Features: No unauthorized routes or Open Areas, parking, and staging areas are proposed under this alternative; therefore, there would be no project design features implemented.

Alternative 4

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 9 proposed unauthorized routes and no Open Areas, parking, and staging areas within suitable FYLF habitat in the project area. Direct and indirect effects are similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 9 unauthorized routes (0.69 miles), 8 stream crossings and no Open Areas, parking, and staging areas proposed for addition to the NFTS within suitable FYLF habitat (Table 3- 217). There are no unauthorized routes or Open Areas, parking, and staging areas proposed within occupied habitat. This alternative would have beneficial effects compared to Alternative 1 by excluding use of approximately 25.21 miles (97.3 percent of total miles) of inventoried unauthorized routes within FYLF habitat and provide for natural recovery over the long term. Open Area access would be limited to only those which are currently managed. Direct and indirect effects would be similar to those described in Alternative 2.

Since there is a slight decrease in the number of unauthorized routes proposed to be added to the NFTS within FYLF habitat from Alternatives 2 and 5, there would be an incremental decrease in the potential direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes located within FYLF occupied/suitable habitat accounts for less than 1 percent of the habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 18 NFTS roads (6.5 miles) currently closed year-round that are within 165 feet of suitable FYLF habitat are proposed for a new seasonal closure date (Table 3- 217), but would not be open for vehicle travel until at least May 1st of each year. Effects would be the same as described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable FYLF habitat are described in Alternative 2.

Alternative 5

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 23 proposed unauthorized routes and 2 Open Areas, parking, and staging areas within suitable/occupied FYLF habitat in the project area. Effects would be similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 23 unauthorized routes (2.76 miles), 23 stream crossings and 2 Open Areas, parking, and staging areas (1 acre) within suitable FYLF

habitat proposed for addition to the NFTS (Table 3- 217). No unauthorized routes or Open Areas, parking, and staging areas are proposed within occupied habitat. This alternative would have a beneficial effect by excluding use of approximately 23.14 miles (89.3 percent of total miles) of inventoried unauthorized routes within FYLF habitat and provide for natural recovery over the long term. Open Area access would be limited to these two areas as well as only those which are currently managed. There would be continued direct and indirect effects to suitable FYLF habitat along proposed unauthorized routes and Open Areas, parking, and staging areas. However, short-term effects of adding the unauthorized routes to the NFTS could have a beneficial effect on FYLF habitat since these routes would be brought up to Forest road standards reducing sediment and stabilizing stream crossings.

Since there is a slight increase in the number of unauthorized routes added to the system within suitable FYLF habitat compared to Alternatives 2 and 4, there would be an incremental increase in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within FYLF occupied/suitable habitat accounts for less than 1 percent of the habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 19 NFTS roads (6.72 miles) currently closed year-round that are within 165 feet of suitable FYLF habitat are proposed for a new seasonal closure date (Table 3- 217), but would not be open for vehicle travel until at least May 1st of each year. Direct and indirect effects would be similar to those described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable FYLF habitat are described in Alternative 2.

Table 3- 217. Direct and Indirect Effects Indicators for Alternative 1 through 5 for the Foothill Yellow-legged Frog

Foothill yellow-legged Frog - Direct and Indirect Effects Indicators	Alt. 1¹	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of stream crossings (perennial and intermittent) on proposed unauthorized routes to be added to the NFTS within known occupied stream habitat	1	0	0	0	0
Number of unauthorized routes added to the NFTS within 165 feet of known occupied stream habitat	1	0	0	0	0
Miles of unauthorized routes added to the NFTS within 165 feet of known occupied stream habitat	0.46	0	0	0	0
Number of Open Areas, parking, and staging areas proposed to be added to the NFTS within 165 feet of known occupied stream habitat	0	0	0	0	0
Acres of Open Areas, parking, and staging areas proposed to be added to the NFTS within 165 feet of known occupied stream habitat	0	0	0	0	0
Number of unauthorized routes added to the NFTS within 165 feet of suitable stream habitat	528	10	0	9	23
Miles of unauthorized routes added to the NFTS within 165 feet of suitable stream habitat	25.9	2.15	0	0.69	2.76
Number of stream crossings (perennial and intermittent) on proposed unauthorized routes added to the NFTS within 165 feet of suitable stream habitat.	124	8	0	8	23
Number of Open Areas, parking, and staging areas proposed to be added to the NFTS within 165 feet of suitable stream habitat	279	0	0	0	2
Acres of Open Areas, parking, and staging areas proposed to be added to the NFTS within 165 feet of suitable stream habitat	20.3	0	0	0	1.0
Percentage of occupied/suitable habitat directly impacted by unauthorized routes/Open Areas, parking, and staging areas added to the NFTS.	0.10 %	0.005 %	0 %	0.001 %	0.01 %
Number of NFTS roads with a year-round closure proposed for a season of use change within 165 feet of potential (suitable or occupied) stream habitat.	0	11	0	18	19
Miles of NFTS roads with a year-round closure proposed for a season of use change within 165 feet of potential (suitable or occupied) stream habitat.	0	17.9	0	6.5	6.72

¹ Alternative 1 is calculated as an estimate of the total number and miles of unauthorized routes / acres of Open Areas, parking, and staging areas that have been inventoried (2005) in cross-

country travel (including areas closed to cross-country (Figure 1-3)) in order to display a comparison between alternatives

Cumulative Effects Unique to this Species

Cumulative impacts have likely contributed to the decline in FYLF numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the direct and indirect effects evaluated for FYLF and Effects Common to all Aquatic Wildlife discussion, there are 4 HUC8 subdrainages that were evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within these subdrainages, 83 unauthorized routes (8.96 miles) have been inventoried intersecting 1076.4 acres within 165 feet potential suitable FYLF habitat. This represents 1 percent of suitable habitat for FYLF subject to indirect affects related to unstable stream channels.

Addition of unauthorized routes in these subdrainages along with cumulative effects discussed would increase the potential of direct, indirect and cumulative effects to the FYLF and it habitat.

Summary of Effects Analysis across All Alternatives

Historically, Foothill yellow-legged frogs (FYLF) occurred between sea level and 6,000 feet in most Pacific drainages west of the Sierra-Cascade crest from the Santiam River, Marion County Oregon, to the San Gabriel Drainage, Los Angeles County, California (Hayes and Jennings 1988). On the SNF, only one population has been documented. Direct, indirect and cumulative effects from **Alternatives 3** *will not affect* the FYLF or its habitat. (*No Effect*). **Alternatives 2, 4 and 5** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the FYLF*. Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to FYLF. **Alternative 1** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the FYLF*. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record.

Relictual Slender Salamander – Affected Environment

Species and Habitat Account

The Relictual slender salamander (RSS) is a Forest Service sensitive species whose distribution was considered to extend from the central California coast to nearly the length of the Sierra Nevada mountain range at elevations from 560 to 7,600 feet (Hansen 2006). However, this species was added to the sensitive species list in 1998 prior to research (Jockush et al. 1998; Jockush and Wake 2002) being conducted, which subsequently delineated the RSS into four separate species. Three of the revised species have distributions outside the SNF boundary. The 4th species, the Kings River slender salamander, occurs within the Forest. Distribution of the RSS is now restricted to the west slopes of the southern Sierra Nevada mountain range, from the lower Kern River Canyon to the highlands drained by the Tule and Kern rivers (Hansen 2006), thus the RSS does not occur on the SNF. The sensitive species list has not been updated to reflect changes to species and distribution within the slender salamander complex.

Hansen (1998) indicated that the RSS previously noted as occurring on the Forest, would presently be considered Kings River slender salamander, which are believed to be restricted within the Kings and Kaweah River drainages. The Kings River slender salamander is known to occur on the Forest at several sites in the Kings River drainage below 3,000 feet elevation. The CNDDB (CDFG 2005) lists the Kings River slender salamander as G1S1 (globally and sub-

National critically imperiled), similar to NatureServe, while the World Conservation Union lists the species as V(D2) (vulnerable, populations with very restricted area of occupancy). The species: gregarious slender salamander (*GSS*) as described by Hanson (2006), closely follows the original range (though at slightly lower elevations (<6,000 feet)) of the RSS extending from Yosemite National Park to the Kern River. *GSS* has no ranking from the CNDDDB; G3 (global, vulnerable) from NatureServe; and LC (least concern; widespread and abundant) from the World Conservation Union. Neither Kings River slender salamander nor *GSS* are on the current sensitive species list, but are being considered as part of the revision to the list. There are more than 200 specimens of *GSS* collected across the Forest within the Museum of Vertebrate Zoology and the California Academy of Science.

Members of the genus *Batrachoseps* (slender salamanders) rely on passages made by other animals or produced by root decay or soil shrinkage (Yanev 1978). They are usually found under boards, rotting logs, rocks, bark and surface litter and tree debris (Jennings and Hayes 1994). Hansen (2006) notes the species as occurring in damp places (or on the surface during wet periods) near meadow edges and seeps. The CWHR highly suitable habitats (CDFG 2005) for this species that occur within the project area are blue oak woodland, blue oak – foothill pine, montane hardwood, montane hardwood – conifer, montane riparian, sierra mixed conifer, valley foothill riparian, valley oak woodland and white fir. In riparian areas any size tree and greater than 10 percent canopy closure is highly suitable. In oak woodland areas trees greater than 11 inches in diameter and canopy closures greater than 40 percent is highly suitable. In montane and white fir areas trees greater than 24 inches and canopy closures greater than 40 percent is highly suitable. Use by the RSS is in relatively small, mesic areas (e.g., swales, drainages, etc.) with an overstory of trees or shrubs and abundant rocks, litter or woody debris (CDFG 2005).

Lacking updates to the sensitive species list to re-define descriptions, ranges or listing status, the RSS is analyzed in this document under the original, broader description. The range of the RSS from the 1998 sensitive species list is from Fresno County, south to the Greenhorn Mountains and Kern River Canyon in Kern County.

For the purposes of this analysis, suitable habitat is being defined conservatively as within 300 feet of any known sight records of a slender salamander species and within 300 feet of any known seeps, springs, bogs, meadows or perennial streams. There is potentially suitable habitat within any riparian conservation areas (RCAs) occurring 7,600 feet and below in elevation. Using RCAs can estimate the total acreages available for this species; though through more detailed analysis a lesser amount of acreage may actually be suitable. Since defining suitable habitat for this species across the Forest is problematic, an estimate using the RCAs was generated. Surveys have not been conducted in suitable habitat within the project area; therefore, this analysis assumes that suitable habitat is occupied.

Relictual Slender Salamander – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects (beneficial or adverse) to the RSS by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized routes and/or Open Areas, parking, and staging areas) to the NFTS,

- Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 in Section 3.14.1)
- Implementing project design features.

These actions may have direct and indirect effects on the RSS through: increasing or decreasing human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). Although the RSS has been re-categorized and is not considered present on the SNF, slender salamanders in general move only short distances (about 5 feet) and are most vulnerable in areas where routes cross springs or riparian areas of perennial stream / meadows. Slender salamanders may be most vulnerable to habitat fragmentation and degradation of perennial habitat such as springs and meadows (Hayes and Jennings 1994).

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the RSS. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Number of unauthorized routes to be added to the NFTS within 300 feet of suitable habitat.
- Miles of unauthorized routes added to the NFTS within 300 feet of suitable habitat.
- Number of stream crossings (perennial) on unauthorized routes added to the NFTS within 300 feet of suitable habitat.
- Acres of proposed Open Areas, parking, and staging areas added to the NFTS within 300 feet of suitable habitat.
- Percentage of suitable habitat directly impacted by unauthorized routes/Open Areas, parking, and staging areas added to the NFTS.
- Number of NFTS roads with a year-round closure proposed for a season of use change within 300 feet of suitable habitat.
- Miles of NFTS roads with a year-round closure proposed for a season of use change within 300 feet of suitable habitat.

Alternative 1 – No Action

Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1-3). About 102,301 acres of suitable habitat are located within the project area. Approximately 10 percent of potential slender salamander habitat is located within areas prohibited to cross-country travel shown in Figure 1-3.

For the purpose of this analysis, unauthorized route miles and Open Area, parking and staging acres inventoried (2005) (including those inventoried in prohibited cross-country travel areas) were calculated to get an approximate base number of miles/area that have been created as a result of cross-country travel (Table 3- 218). Within suitable slender salamander habitat, approximately 943 unauthorized routes (96.5 miles), 100 perennial stream crossings and 1110 Open Areas, parking, and staging areas (88.6 acres) have been inventoried. One hundred of those unauthorized routes were locate within areas prohibited to cross-country travel.

It is assumed that wheeled vehicles would continue to use all unauthorized routes and Open Areas, parking, and staging areas inventoried, as well potentially continue to create new routes and Open Areas, parking, and staging areas within the 102,301 acres of suitable habitat in the project area. The use of unauthorized routes and Open Areas, parking, and staging areas and the continued proliferation of new routes/areas would increase both direct and indirect effects to the slender salamander and habitat. This, as well as having no road maintenance or improvement plans for any unauthorized routes or Open Areas, parking, and staging areas created, would increase the amount of direct and indirect effects to the slender salamander or its habitat. Short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term.

Currently the potential for direct effects such as crushing or injuring slender salamanders from vehicles traveling on inventoried (2005) unauthorized routes and Open Areas, parking and staging areas located within suitable habitat accounts for than 1 percent of the habitat analyzed.

Additions to the NFTS: No unauthorized routes or Open Areas, parking, and staging areas identified to add to the NFTS in Alternative 1, however, use of existing inventoried (2005) unauthorized routes and Open Areas, parking and staging areas would continue.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no proposed changes to the current season of use on NFTS roads.

Project Design Features: There are no project design features implemented under this alternative because no changes are proposed to the NFTS.

Alternative 2 – Proposed Action

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 48 proposed unauthorized routes and 1 Open Area within suitable slender salamander habitat in the project area. This would eliminate the potential use of approximately 101,000 acres of suitable slender salamander habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the slender salamander. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce the direct and indirect effects to slender salamander habitat from motorized travel over the short and long term.

Additions to the NFTS: Under this alternative, there are 48 unauthorized routes (7.25 miles), 10 perennial stream crossings and 1 Open Area (3.14 acres) proposed for addition to the NFTS within suitable slender salamander habitat (Table 3- 218). This alternative would have beneficial effects by excluding the use of approximately 89.25 miles (92.5 percent of total miles) of inventoried unauthorized routes within slender salamander habitat and provide for natural recovery over the long term. There would be continued direct and indirect effects to suitable slender salamander habitat along proposed unauthorized routes and Open Area over the long term. The short-term effects of adding the unauthorized routes to the NFTS could have beneficial effects on slender salamander habitat since these routes would be brought up to NFTS road standards reducing sediment, stabilizing stream crossings and improve habitat condition. Open Areas, parking, and staging areas would be limited to those that are currently managed.

Since there is a slight decrease in the number of unauthorized routes proposed to be added to the NFTS within suitable slender salamander habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. Unauthorized routes or Open Areas, parking, and staging areas would be located within suitable,

but not known occupied habitat. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within slender salamander suitable habitat accounts for less than 1 percent of the habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 37 NFTS roads (10.8 miles) currently closed year-round that are within 300 feet of suitable slender salamander habitat are proposed for a new seasonal closure date (Table 3- 218), but would not be open for vehicle travel until at least April 1st of each year (depending on elevation). A wet weather closure should reduce the potential of native surface road sediment run-off into associated slender salamander habitat, reduce streambank disturbance at stream crossings and minimize direct and indirect effects on riparian habitat. Closure of routes during the wet weather season would likely reduce disturbance to the slender salamander and habitat.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable slender salamander habitat include: drain dips, stream crossing improvements (i.e. hardening) gully repair, additional waterbar installation, culvert replacement or installation or barricades. Implementation of these project design features may result in short-term disturbance to some individual slender salamanders, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long term. For aquatic/riparian species design features on unauthorized routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record. For site specific aquatic/riparian species design features, refer to Appendix A of this document.

Alternative 3

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only NFTS roads. This would eliminate the potential use of 102,301 acres of suitable slender salamander habitat available to motor vehicles traveling cross-country, which would have beneficial effects to the slender salamander and habitat. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to slender salamanders from motorized travel over the short and long term.

Adding Routes or Open Areas, parking, and staging areas to the NFTS: Under this alternative, there are no unauthorized routes or Open Areas, parking and staging areas proposed to be added to the NFTS.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no proposed changes to the current season of use on NFTS roads.

Project Design Features: No additional unauthorized routes or Open Areas, parking, and staging areas are proposed under this alternative; therefore, there would be no project design features to be implemented.

Alternative 4

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 45 proposed unauthorized routes and 2 Open Areas, parking, and staging areas within suitable

slender salamander habitat in the project area. Effects are similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 45 unauthorized routes (5.25 miles) and 2 Open Areas, parking, and staging areas (3.17 acres) proposed for addition to the NFTS within suitable slender salamander habitat (Table 3- 218). This alternative would have a beneficial effect by excluding the use of approximately 91.25 miles (94.6 percent of total miles) of inventoried (2005) unauthorized routes within slender salamander habitat and provide for natural recovery over the long term. Effects would be similar to those described in Alternative 2.

Since there is a decrease in the number of unauthorized routes proposed to be added to the NFTS within suitable slender salamander habitat from Alternatives 1, 2 and 5, there would be an incremental decrease in the potential direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within slender salamander suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 40 NFTS roads (13.07 miles) currently closed year-round that are within 300 feet of suitable slender salamander habitat are proposed for a new seasonal closure date (Table 3- 218), but would not be open for vehicle travel until at least April 1st of each year (depending on elevation). This wet weather closure should give adequate protection to native surface roads and minimize direct and indirect effects to slender salamanders and habitat.

Project Design Features: Under this alternative, project design features within suitable slender salamander habitat are outlined in Alternative 2.

Alternative 5

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 86 proposed unauthorized routes and 7 Open Areas, parking, and staging areas within suitable slender salamander habitat in the project area. Effects would be similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 86 unauthorized routes (10.8 miles) and 7 Open Areas, parking, and staging areas (9.53 acres) proposed for addition to the NFTS within suitable slender salamander habitat (Table 3- 218). This alternative would have a beneficial effect by excluding the use of approximately 85.7 miles (88.8 percent of total miles) of inventoried (2005) unauthorized routes within slender salamander habitat and provide for natural recovery over the long term. Effects would be similar to those described in Alternative 2.

Since there is an increase in the number of unauthorized routes proposed to be added to the NFTS within suitable slender salamander habitat from Alternatives 2 and 4, there would be an increase in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within slender salamander suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 48 NFTS roads (14.05 miles) currently closed year-round that are within 300 feet of suitable slender salamander habitat would have a new seasonal closure date (Table 3- 218), but would not be open for vehicle travel until at least April 1st of each year (depending on elevation). This wet weather closure should give protection to native surface roads and minimize direct and indirect effects to slender salamanders and habitat.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable slender salamander habitat are outlined in Alternative 2.

Table 3- 218. Direct and Indirect Effect Indicators for Alternative 1 through 5 for the Relictual Slender Salamander

Relictual Slender Salamander - Direct and Indirect Effects Indicators	Alt. 1¹	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed unauthorized routes to be added to the NFTS within 300 feet of suitable habitat	943	48	0	45	86
Miles of unauthorized routes added to the NFTS within 300 feet of suitable habitat.	96.5	7.25	0	5.25	10.8
Number of stream crossings (perennial) on unauthorized routes added to the NFTS within 300 feet of suitable habitat.	100	11	0	5	12
Number of proposed Open Areas, parking, and staging areas added to the NFTS within 300 feet of suitable habitat.	1110	1	0	2	7
Acres of proposed Open Areas, parking, and staging areas added to the NFTS within 300 feet of suitable habitat.	88.6	3.14	0	3.17	9.53
Percentage of suitable habitat directly impacted by unauthorized routes/Open Areas, parking, and staging areas added to the NFTS.	0.18 %	0.01 %	0 %	0.01 %	0.02 %
Number of NFTS roads with a year-round closure proposed for a season of use change within 300 feet of suitable habitat	0	37	0	40	48
Miles of NFTS roads with a year-round closure proposed for a season of use change within 300 feet of suitable habitat	0	10.8	0	13.07	14.05

¹ Alternative 1 is calculated as an estimate of the total number and miles of unauthorized routes / acres of Open Areas, parking, and staging areas that have been inventoried (2005) in cross-country travel areas (including areas closed to cross-country (Figure 1-3)) in order to display a comparison between alternatives.

Cumulative Effects Unique to this species

Cumulative impacts have likely contributed to the decline in slender salamander numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the direct and indirect effects evaluated for slender salamander and Effects Common to all Aquatic Wildlife discussion, there are 5 HUC8 subdrainages that were evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within these subdrainages, 62 unauthorized routes (9.83 miles) have been inventoried intersecting 1782.5 acres within 300 feet potential suitable slender salamander habitat. In addition to NFTS roads within

suitable habitat, this represents less than 1 percent of suitable habitat for slender salamander subject to indirect affects related to unstable stream channels across the SNF.

For slender salamanders, the cumulative effect of all the activities may lead to the isolated unknown populations being harmed. It is extremely difficult to determine the locations of this species and thus areas that have been identified as potential suitable habitat may not provide adequate protection.

Addition of unauthorized routes in these subdrainages along with cumulative effects discussed would increase the potential of direct, indirect and cumulative effects to the slender salamander and its habitat.

Summary of Effects Analysis across All Alternatives

The Relictual slender salamander (RSS) is a Forest Service sensitive species whose distribution was considered to extend from the central California coast to nearly the length of the Sierra Nevada mountain range at elevations from 560 to 7,600 feet (Hansen 2006). Direct, indirect and cumulative effects from **Alternatives 3** *will not affect* the slender salamander or its habitat (*No Effect*). **Alternatives 2, 4 and 5** *may affect individual slender salamanders, but is not likely to cause a trend toward Federal listing or a loss of viability* for either the Kings River or gregarious slender salamanders. **Alternative 1** (current condition) has the highest probability of negative effects to slender salamanders. Based on the indicators evaluated, **Alternative 1** *may affect individual slender salamanders, but is not likely to cause a trend toward Federal listing or a loss of viability* for either the Kings River or gregarious slender salamanders. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record.

Mountain Yellow-legged Frog – Affected Environment

Species and Habitat Account

This species is a high elevation species that only occurs in the Sierra Nevada Mountains of California from elevations of 4,500 feet to 12,000 feet (CDFG 2005). The range of this species extends from Plumas County to Tulare County. DNA sequencing by Vrebenburg (2007) suggests two species within the historic range of MYLF. *R. muscosa* (Southern mountain yellow-legged frog) would apply to populations south of the divide between the Middle and South Forks of the Kings River. Populations to the north (including the SNF) would be considered *R. Sierra* (Sierra Nevada mountain yellow-legged frog).

Vrebenburg et al. (2007) report that MYLF no longer occurs at more than 92 percent of its historic sites, in the Sierra Nevada, with even greater declines in the Transverse Range and southern California. The USDI-USFWS found that listing was warranted as threatened or endangered for this species however, the listing was precluded at the time based on other higher priority issues (68 FR 2283). The MYLF is currently designated as a candidate species and is currently managed as sensitive by the Pacific Southwest Region of the Forest Service (1998).

On the SNF there are 38 known locations currently occupied by MYLF. The majority of occupied sites are at high elevations within wilderness areas; however there have been recent confirmed detections on the SNF in meadow streams around 5100 feet elevation.

MYLF typically live along the edge of watercourses and rely heavily on an aquatic environment for foraging, shelter, breeding and protection from predators. Primary habitat is perennial streams, lakes and ponds (CDFG 2005). The CWHR highly suitable habitats (CDFG 2005) for this species are lacustrine, montane riparian, riverine and wet meadows with mostly submerged and flooded

gravels, cobbles and boulders with trees greater than one inch in diameter, short or tall herbaceous cover and vegetation and canopy closures greater than 10 percent.

For the purposes of this analysis, potential suitable habitat for this species was evaluated as perennial streams (stream order 4 and greater, although juveniles have been noted as using intermittent streams to disperse (Bradford 1991)) and lakes and ponds above 5,000 feet in elevation with a 165 feet dispersal area on either side of streams and around lakes and ponds (CDFG 2005). Since aquatic species or habitat surveys were not conducted on all potential suitable habitats determined by GIS within the project area, a conservative approach was taken for suitable habitat available. General field data was collected on unauthorized routes and Open Areas, parking, and staging areas proposed in action alternatives to confirm suitable habitat.

Mountain Yellow-legged Frog – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects (beneficial or adverse) to the MYLF by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized routes and/or Open Areas, parking, and staging areas) to the NFTS,
- Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 in Section 3.14.1), and
- Implementing project design features.

These actions may have direct and indirect effects on MYLFs through: increasing or decreasing human-caused mortality, changes in behavior and habitat modification (see Effects Common to all Aquatic Wildlife). These frogs may be less susceptible to motorized travel management because they are a highly aquatic species (Hayes and Jennings 1986), therefore, routes within a RCA of suitable stream habitat would have less affect on these frogs than other more terrestrial aquatic/riparian species. The MYLF may however, be more vulnerable to affects of motorized travel management at stream crossings where suitable habitat is identified. Potential sediment movement from routes into suitable stream habitat as an indirect effect may have the most affects to the species and habitat.

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the MYLF. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared. Suitable habitat is defined as perennial streams (stream order 4 and above) and lakes and ponds above 5000 feet elevation:

- Number of proposed unauthorized routes added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Miles of proposed unauthorized routes added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).

- Number of stream crossings (perennial) on unauthorized routes added to the NFTS within 165 feet of suitable habitat.
- Number of proposed Open Areas, parking, and staging areas added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Acres of proposed Open Areas, parking, and staging areas within 165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Percentage of suitable habitat directly impacted by unauthorized routes and Open Areas, parking, and staging areas added to the NFTS.
- Number of NFTS roads with a year-round closure proposed for a season of use change within 165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Miles of NFTS roads with a year-round closure proposed for a season of use change within 165 feet of suitable habitat (including perennial streams and lakes/ponds).

Alternative 1 – No Action

Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1-3). About 32,747 acres of suitable habitat are located within the project area. Approximately 75 percent of potential MYLF habitat is located within areas prohibited to cross-country travel shown in Figure 1-3. For the purpose of this analysis, route miles and Open Areas, parking, and staging areas acres inventoried (2005) (including those inventoried in prohibited cross-country travel areas) were calculated to get an approximate base number of miles/area that have been created as a result of cross-country travel (Table 3- 219). Within suitable MYLF habitat, approximately 292 unauthorized routes (17.4 miles), 136 perennial stream crossings and 498 Open Areas, parking, and staging areas (36.7 acres) have been inventoried. Eighty-five inventoried unauthorized routes and approximately half of the Open Areas, parking, and staging areas were located within areas prohibited to cross-country travel.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and Open Areas, parking, and staging areas inventoried, as well potentially continue to create new routes / Open Areas, parking, and staging areas within the 32,747 acres of suitable habitat in the project area. The use of unauthorized routes and Open Areas, parking, and staging areas and the continued proliferation of new routes / Open Areas, parking, and staging areas would increase both direct and indirect effects to MYLF individuals and habitat. No road maintenance or improvement plans for any unauthorized routes or Open Areas, parking, and staging areas created would also add to increasing direct and indirect effects to the MYLF and its habitat over the short and long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term.

Currently the potential for direct effects such as crushing or injuring MYLF from vehicles traveling on inventoried (2005) unauthorized routes and Open Areas, parking and staging areas located within suitable habitat accounts for less than 1 percent of the habitat analyzed.

Additions to the NFTS: No unauthorized routes or Open Areas, parking, and staging areas identified to add to the NFTS in Alternative 1, however, use of existing inventoried (2005) unauthorized routes and Open Areas, parking and staging areas would continue.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are changes to the current season of use on NFTS roads.

Project Design Features: There are no project design features implemented for this alternative because no changes are proposed to the NFTS.

Alternative 2 – Proposed Action

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 18 proposed unauthorized routes and 0 unmanaged Open Areas, parking, and staging areas within suitable MYLF habitat in the project area. This alternative would eliminate the potential use of approximately 32,700 acres of suitable MYLF habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the MYLF individuals and habitat. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to MYLF from motorized travel over the short and long term.

Additions to the NFTS: Under this alternative, there are 18 unauthorized routes (1.37 miles), 1 perennial stream crossing and no Open Areas, parking, and staging areas proposed for addition to the NFTS within suitable MYLF habitat (Table 3- 219). This alternative would have a beneficial effect by excluding the use of approximately 16.03 miles (92.1 percent of total miles) of inventoried (2005) unauthorized routes within potential MYLF habitat and provide for natural recovery over the long term. There would be continued direct and indirect effects to suitable MYLF habitat along proposed unauthorized routes over the long term. The short-term effects of adding the unauthorized routes to the NFTS could have a beneficial effect on MYLF habitat since these unauthorized routes would be brought up to Forest road standards reducing sediment, stabilizing stream crossings and improve habitat condition. Open Areas, parking, and staging areas would be limited to those that are currently managed.

Since there is a slight decrease in the number of unauthorized routes proposed for addition to the NFTS within MYLF habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within MYLF suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, 15 NFTS roads (2.27 miles) currently closed year-round that are within 165 feet of suitable MYLF habitat are proposed for a new seasonal closure date (Table 3- 219), but would not be open for vehicle travel until at least May 20th of each year. A wet weather closure should reduce the potential of native surface road sediment run-off into associated MYLF habitat, reduce streambank disturbance at stream crossings and minimize direct and indirect effects to aquatic and terrestrial habitat. Closure of routes during the wet weather season would likely reduce disturbance to all life stages of the MYLF and habitat.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable MYLF habitat include: stabilize stream crossing (i.e. hardening), waterbars, barriers to prevent vehicles from accessing unauthorized routes, drainage improvements to protect ephemeral streams and marking end of a route with barriers or signs. Implementation of these

project design features may result in short-term disturbance to some individuals, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long term. For aquatic/riparian species design features on unauthorized routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record. For site-specific aquatic/riparian species design features, refer to Appendix A of this document.

Alternative 3

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only NFTS roads. This would eliminate the potential use of approximately 32,747 acres of suitable MYLF habitat available to motor vehicles traveling cross-country in Alternative 1 and result in a reduction of direct and indirect effects. Implementation of this alternative would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to MYLF from motorized travel over the short and long term.

This alternative would have a beneficial effect on the MYLF and its habitat by excluding approximately 17.4 miles of inventoried unauthorized routes from authorized use in suitable habitat and allow for their natural recovery over the long term. Access to Open Areas, parking, and staging areas would be only those that are currently managed.

Additions to the NFTS: There are no unauthorized routes or Open Areas, parking, and staging areas proposed to be added to the NFTS.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no changes to the current season of use on NFTS roads.

Project Design Features: No unauthorized routes or Open Areas, parking, and staging areas are proposed under this alternative; therefore, there would be no project design features to be implemented.

Alternative 4

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 10 proposed unauthorized routes and no Open Areas, parking, and staging areas within suitable MYLF habitat in the project area. Direct and indirect effects are similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 10 unauthorized routes (0.63 miles), 1 perennial stream crossing and no Open Areas, parking, and staging areas proposed for addition to the NFTS within suitable MYLF habitat (Table 3- 219). This alternative would have some beneficial effects by excluding use of approximately 16.77 miles (96.4 percent of total miles) of inventoried (2005) unauthorized routes within MYLF habitat and provide for natural recovery over the long term. Open Area access would be limited to only those which are currently managed. Direct and indirect effects would be similar to those described in Alternative 2.

Since there is a slight decrease in the number of unauthorized routes proposed to be added to the NFTS within suitable MYLF habitat from Alternatives 2 and 5, there would be an incremental decrease in the potential direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes located within MYLF suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to

populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 14 NFTS roads (2.7 miles) currently closed year-round that are within 165 feet of suitable MYLF habitat are proposed for a new seasonal closure date (Table 3- 219), but would not be open for vehicle travel until at least May 20th of each year. Effects would be the same as described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable MYLF habitat would be as described in Alternative 2.

Alternative 5

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 30 proposed unauthorized routes and 2 Open Areas, parking, and staging areas within suitable MYLF habitat in the project area. Effects would be similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 30 unauthorized routes (2.02 miles), 2 perennial stream crossings and 2 Open Areas, parking, and staging areas (2.8 acres) within suitable MYLF habitat proposed for addition to the NFTS (Table 3- 219). This alternative would have the least amount of beneficial effects from all action alternatives by excluding use of approximately 15.53 miles (88.4 percent of total miles) of inventoried (2005) unauthorized routes within MYLF habitat and provide for natural recovery over the long term. Open Area access would be limited to 2 areas as well as only those which are currently managed. There would be continued direct and indirect effects to suitable MYLF habitat along proposed unauthorized routes and Open Areas, parking, and staging areas. However, short-term effects of adding the unauthorized routes to the NFTS could have some beneficial effect on MYLF habitat since these unauthorized routes would be brought up to Forest road standards reducing sediment and stabilizing stream crossings.

Since there is a slight increase in the number of unauthorized routes proposed to be added to the NFTS within suitable MYLF habitat compared to Alternatives 2 and 4, there would be an incremental increase in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within MYLF suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 15 NFTS roads (2.8 miles) currently closed year-round that are within 165 feet of suitable MYLF habitat are proposed for a new seasonal closure date (Table 3- 219), but would not be open for vehicle travel until at least May 20th of each year. Effects would be the same as described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable MYLF habitat are described in Alternative 2.

Table 3- 219. Direct and Indirect Effect Indicators for Alternative 1 through 5 for the Mountain Yellow-legged Frog

Mountain yellow-legged Frog - Direct and Indirect Effects Indicators	Alt. 1¹	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed unauthorized routes added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).	292	18	0	10	30
Miles of unauthorized routes added to the NFTS within 165 feet of known suitable habitat (including perennial streams and lakes/ponds).	17.4	1.37	0	0.63	2.02
Number of stream crossings (perennial) on unauthorized routes added to the NFTS within 165 feet of suitable habitat.	136	1	0	4	2
Number of proposed Open Areas, parking, and staging areas added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).	498	0	0	0	2
Acres of proposed Open Areas, parking, and staging areas within 165 feet of suitable habitat (including perennial streams and lakes/ponds)	36.7	0	0	0	2.8
Percentage of suitable habitat directly impacted by unauthorized routes/Open Areas, parking, and staging areas added to the NFTS.	0.16 %	0.004 %	0 %	0.002 %	0.01 %
Number of NFTS roads with a year-round closure proposed for a season of use change within 165 feet of suitable habitat (including perennial streams and lakes/ponds).	0	15	0	14	15
Miles of NFTS roads with a year-round closure proposed for a season of use change within 165 feet of suitable habitat (including perennial streams and lakes/ponds).	0	2.27	0	2.7	2.8

¹ Alternative 1 is calculated as an estimate of the total number and miles of unauthorized routes / acres of Open Areas, parking, and staging areas that have been inventoried (2005) in cross-country travel areas (including areas closed to cross-country travel (Figure 1-3)) in order to display a comparison between alternatives

Cumulative Effects Unique to this Species

Cumulative impacts have likely contributed to the decline in MYLF numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the direct and indirect effects evaluated for MYLF and Effects Common to all Aquatic Wildlife discussion, there is one HUC8 subdrainage that was evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within this subdrainage, 10 unauthorized routes (1.25 miles) have been inventoried intersecting 97.7 acres within 165 feet potential suitable MYLF habitat. In addition to roads within this HUC8, less than 1 percent of suitable habitat for MYLF is subject to indirect affects related to unstable stream channels.

Addition of unauthorized routes in this subdrainages along with cumulative effects discussed could increase the potential of direct, indirect and cumulative effects to the MYLF and its habitat.

Summary of Effects Analysis across All Alternatives

The Mountain yellow-legged frog is a high elevation species that only occurs in the Sierra Nevada Mountains of California from elevations of 4,500 feet to 12,000 feet (CDFG 2002). Direct, indirect and cumulative effects from **Alternatives 3** will not affect the MYLF or its habitat (*No Effect*). **Alternatives 2, 4 and 5** may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the MYLF. Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to MYLF. **Alternative 1** may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the MYLF. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes, Strand 2009) located in the project record.

Western Pond Turtle – Affected Environment

Species and Habitat Account

The central Sierra Nevada Mountains are an area of overlap between two pond turtle subspecies, *Clemmys marmorata marmorata* (northwestern pond turtle) and *Clemmys marmorata pallida* (southwestern pond turtle). These pond turtles, collectively known as western pond turtles (WPT), are found from sea level to 4,690 feet in elevation (Jennings and Hayes 1994). There are records of WPT detected at elevation exceeding 6,000, but turtles were known to be introduced at these sites (Jennings and Hayes 1994). Historically, WPT occurred along the west slope of Cascade/Sierra Nevada mountain ranges from the Columbia River (Slater 1962) to northern Baja California (Stebbins 1985).

On the SNF, surveys for WPT have been conducted between 1993 and 2008. Numerous detections have been identified across the SNF.

In 1992 the USFWS was petitioned to consider the species for listing under the Endangered Species Act (USDSI-USFWS 1992). Following review, the USFWS declined to list the species. The Pacific Southwest Region of the Forest Service designated the western pond turtle as a sensitive species in 1993.

WPT occur in a variety of both permanent and intermittent aquatic habitats and is often restricted to areas near the banks or in quiet backwaters where the current is relatively slow and basking sites and refugia are available (CDFG 2005). Movements of WPT of over 1 mile have been reported when local aquatic habitat conditions change (e.g. drought), however most stay within 325 feet of the stream channel mainly moving during breeding and egg-laying (CDFG 2005). Aerial basking on logs and rocks occurs when air temperature exceeds water temperature (Holland 1991). The CWHR highly suitable habitats (CDFG 2005) for this species that occur are blue oak woodland, blue oak – foothill pine, fresh emergent wetland, lacustrine, riverine, valley foothill riparian and valley oak woodland. Highly suitable areas include those with short or tall herbaceous plants and vegetation closures greater than 40 percent with trees larger than six inches in diameter and canopy closure greater than 10 percent is highly suitable. In stream, lakes and pond habitats are highly suitable areas are those that range from mostly exposed to flooded cobbles, boulders and bedrock.

For the purposes of this analysis, potential habitat within the SNF was evaluated as perennial (stream order 4 and greater) and intermittent (stream order 3) streams and lakes and ponds below 5000 feet elevation. Terrestrial habitat used for breeding or a movement corridor of 325 feet to either side of the channels and around lakes and ponds would define potential habitat (CDFG 2005). WPT may have movements beyond 325 feet from aquatic habitat for overwintering

purposes, which makes them more susceptible to upland effects than other aquatic/riparian species. Aquatic species or habitat surveys have not been completed across all potential suitable habitats. Potential habitat has been determined by GIS within the project area and assumed occupied. General field data was collected on unauthorized routes and Open Areas, parking, and staging areas proposed in action alternatives to confirm suitable habitat.

Western Pond Turtle – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects (beneficial or adverse) to the WPT by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized routes and/or Open Areas, parking, and staging areas) to the NFTS,
- Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 in Section 3.14.1), and
- Implementing project design features.

These actions may have direct and indirect effects on WPT through: increasing or decreasing human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). Furthermore, WPT may be susceptible to negative effects from motorized travel management because essentially all individuals utilize terrestrial habitats extensively throughout the year and they are vulnerable to mortality at stream crossings. During nesting excursions, females are very sensitive to disturbance and will abandon the nesting effort (Reese 1996, Rathbun et al. 2002) thus WPT may be disturbed by motor vehicle use during this period. The WPT also uses upland habitats extensively as overwintering habitat (Holland 1994, Rathbun et al. 2002), a period of reduced activity partially in response to cold weather and limited availability of food resources.

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the WPT. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared. Suitable habitat was considered to be perennial (stream order 4 and above) and intermittent (stream order 3 only) streams, along with ponds/lakes below 5000 feet elevation.

- Number of proposed unauthorized routes added to the NFTS within 325 feet of suitable stream and pond/lake habitat.
- Miles of proposed unauthorized routes added to the NFTS within 325 feet of suitable stream and pond/lake habitat.
- Number of stream crossings (perennial and intermittent) on unauthorized routes added to the NFTS within 325 feet of suitable stream and pond/lake habitat.
- Number of proposed Open Areas, parking, and staging areas within 325 feet of suitable stream and pond/lake habitat.

- Acres of Open Areas, parking, and staging areas within 325 feet of suitable habitat stream and pond/lake habitat.
- Percentage of suitable habitat directly impacted by unauthorized routes and Open Areas, parking, and staging areas added to the NFTS.
- Number of NFTS roads with a year-round closure proposed for a season of use change within 325 feet of suitable stream and pond/lake habitat.
- Miles of NFTS roads with a year-round closure proposed for a season of use change within 325 feet of suitable stream and pond/lake habitat.

Alternative 1 – No Action

Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1-3). About 91,227 acres of suitable habitat are located within the project area. Less than 5 percent of potential WPT habitat is located within areas prohibited to cross-country travel shown in Figure 1-3. For the purpose of this analysis, route miles and Open Area acres inventoried from 2005 (including those inventoried in areas prohibited to cross-country travel) were calculated to get an approximate base number of miles/area that have been created as a result of cross-country travel (Table 3-220). Within 325 feet of suitable WPT habitat, approximately 481 unauthorized routes (55.2 miles), 132 stream crossings and 373 Open Areas, parking, and staging areas (29.6 acres) have been inventoried (Table 3-220). Seventeen of those unauthorized routes and 15 Open Areas, parking, and staging areas are located within areas prohibited to cross-country travel.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and Open Areas, parking, and staging areas inventoried, as well potentially continue to create new routes / Open Areas, parking, and staging areas within the 91,227 acres of suitable habitat in the project area. The use of inventoried unauthorized routes and the continued proliferation of new routes would increase both direct and indirect effects to the WPT individuals and habitat. Additional cross-country travel within WPT terrestrial habitat could also result in direct and indirect effects to females moving to upland habitat to find suitable nesting locations and hatchlings being crushed or disturbed as they leave to find aquatic habitat. No road maintenance or improvement plans for any unauthorized routes or Open Areas, parking, and staging areas created would also add to increasing direct and indirect effects to the WPT and its habitat over the short and long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term.

Currently the potential for direct effects such as crushing or injuring WPT from vehicles traveling on inventoried (2005) unauthorized routes and Open Areas, parking and staging areas located within suitable habitat accounts for less than 1 percent of the habitat analyzed.

Additions to the NFTS: There are no unauthorized routes or Open Areas, parking, and staging areas identified to add to the NFTS in Alternative 1, however, use of existing inventoried (2005) unauthorized routes and Open Areas, parking and staging areas would continue.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are changes to the current season of use on NFTS roads.

Project Design Features: There are no project design features implemented for this alternative because no changes are proposed to the NFTS.

Alternative 2 – Proposed Action

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 18 proposed unauthorized routes and no unmanaged Open Areas, parking, and staging areas within suitable WPT habitat in the project area. This would eliminate the potential use of approximately 91,100 acres of suitable WPT habitat available to motor vehicles traveling cross-country within the project area and result in beneficial direct and indirect effects to the WPT individuals and habitat. Implementation of this alternative would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to WPT from motorized travel over the short and long term.

Additions to the NFTS: Under this alternative, there are 18 unauthorized routes (5.05 miles), 8 stream crossings and no Open Areas, parking, and staging areas proposed for addition to the NFTS within suitable WPT habitat (Table 3- 220). This alternative would have a beneficial effect to WPT by excluding the use of approximately 50.15 miles (90.9 percent of total miles) of inventoried unauthorized routes within suitable WPT habitat and provide for natural recovery over the long term. Open Area, parking, and staging area access would be limited to only those which are currently managed. There would be continued direct and indirect effects to WPT individuals and suitable habitat along proposed unauthorized routes, however, short-term effects of adding the unauthorized routes to the NFTS could have a beneficial effect on WPT habitat since these unauthorized routes would be brought up to Forest road standards and maintained. This should reduce sediment, stabilize stream crossings and improve habitat condition.

Since there is a slight decrease in the number of unauthorized routes added to the system within suitable WPT habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes located within WPT suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 13 roads (7.7 miles) currently closed year-round that are within 325 feet of suitable WPT habitat are proposed for a new seasonal closure date (Table 3- 220), but would not be open for vehicle travel until at least April 20th of each year. A wet weather closure should reduce the potential of native surface road sediment run-off into associated WPT habitat and minimize direct and indirect effects to WPT habitat. Limiting the season of use would likely reduce potential disturbance to some WPT individuals. Roads located within 325 feet of occupied habitat would not be open for vehicle travel until June 15th which should provide protection from direct effects of breeding movements over terrestrial habitats of WPT.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable WPT habitat include: drain dips, repairing rills, spot rocking dips, waterbars and improvements to stream crossings. Implementation of these project design features may result in short-term disturbance to some individual WPT, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long term. For aquatic/riparian species design features on unauthorized routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record. For site specific aquatic/riparian species design features, refer to Appendix A of this document.

Alternative 3

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only NFTS roads. This would eliminate the potential use of approximately 91,227 acres of suitable WPT habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the WPT. Implementation of this alternative would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to WPT from motorized travel over the short and long term. This alternative would have a beneficial effect on the WPT and its habitat by excluding approximately 55.2 miles of inventoried unauthorized routes from motorized use in suitable WPT habitat and allow for their natural recovery over the long term. Access to Open Areas, parking, and staging areas would be only those that are currently managed.

Additions to the NFTS: There are no unauthorized routes or Open Areas, parking, and staging areas proposed to be added to the NFTS in Alternative 3.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no changes to the current season of use on NFTS roads.

Project Design Features: No unauthorized routes or Open Areas, parking, and staging areas are proposed under this alternative; therefore, there are no project design features to be implemented.

Alternative 4

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 11 proposed unauthorized routes and no Open Areas, parking, and staging areas within suitable WPT habitat in the project area. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 11 unauthorized routes (1.28 miles), 8 stream crossings and no Open Areas, parking, and staging areas proposed for addition to the NFTS within suitable WPT habitat (Table 3- 220). This alternative would have a beneficial effect by excluding use of approximately 53.92 miles (97.7 percent of total miles) of inventoried (2005) unauthorized routes within WPT suitable habitat and provide for natural recovery over the long term. Open Area access would be limited to only those which are currently managed. There would be continued direct and indirect effects to WPT individuals (especially during breeding and overwintering movements) and suitable habitat along proposed unauthorized routes and Open Areas, parking, and staging areas, however, short-term effects of adding the unauthorized routes to the NFTS could have a beneficial effect on WPT habitat since these unauthorized routes would be brought up to forest road standard and maintained. This should reduce sediment and stabilize stream crossings.

Since there is a slight decrease in the number of unauthorized routes proposed to be added to the NFTS within suitable WPT habitat compared to Alternatives 1, 2 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes located within WPT suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 21 NFTS roads (12.2 miles) currently closed year-round that are within 325 feet of suitable WPT habitat are proposed for a new seasonal closure date (Table 3- 220), but would not be open for vehicle travel until at least May 1st of each year. Roads located within 325 feet of occupied habitat would not be open for vehicle travel until June 15th which should provide protection from direct effects of breeding movements over terrestrial habitats of WPT. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable WPT habitat are described in Alternative 2.

Alternative 5

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 30 proposed unauthorized routes and 3 Open Areas, parking, and staging areas within suitable WPT habitat in the project area. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, 30 unauthorized routes (5.21 miles), 23 stream crossings and 3 Open Areas, parking, and staging areas (1.5 acres) are proposed for addition to the NFTS within suitable WPT habitat (Table 3- 220). This alternative would have a beneficial effect by excluding use of approximately 49.99 miles (90.6 percent of total miles) of inventoried (2005) unauthorized routes within WPT habitat and provide for natural recovery over the long term. Open Area, parking, and staging area access would be limited to 3 areas as well as those which are currently managed. One proposed Open Area is located in the Jose Creek CAR and is within 325 feet of an occupied WPT stream. The other two proposed Open Areas, parking, and staging areas are also within 325 feet of WPT occupied streams. There would be continued direct and indirect effects to suitable WPT individuals (especially during breeding and overwintering movements, however appropriate season of use dates were assigned) and habitat along proposed unauthorized routes and Open Areas, parking, and staging areas, however, short-term effects of adding the unauthorized routes to the NFTS could have a beneficial effect on WPT habitat since these unauthorized routes would be brought up to standard reducing sediment, stabilize stream crossings.

Since there is an increase in the number of unauthorized routes proposed to be added to the NFTS within suitable WPT habitat compared to Alternatives 2 and 4, there would be an incremental increase in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within WPT suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 22 NFTS roads (12.8 miles) currently closed year-round that are within 325 feet of suitable WPT habitat would have a new seasonal closure date (Table 3- 220), but would not be open for vehicle travel until at the earliest May 1st of each year (depending on other closure factors). Roads located within 325 feet of occupied habitat would not be open for vehicle travel until June 15th which should provide protection from direct effects of breeding movements over terrestrial habitats of WPT. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within suitable WPT habitat are described in Alternative 2.

Table 3- 220. Direct and Indirect Effects Indicators for Alternative 1 through 5 for the Western Pond Turtle

Western pond turtle - Direct and Indirect Effects Indicators	Alt. 1¹	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed unauthorized routes added to the NFTS within 325 feet of suitable habitat.	481	18	0	11	30
Miles of proposed unauthorized routes added to the NFTS within 325 feet of suitable habitat.	55.2	5.05	0	1.28	5.21
Number of stream crossings (perennial and intermittent) on unauthorized routes added to the NFTS within 325 feet of suitable aquatic habitat.	132	8	0	8	23
Number of proposed Open Areas, parking, and staging areas within 325 feet of suitable habitat.	373	0	0	0	3
Acres of Open Areas, parking, and staging areas within 325 feet of suitable habitat.	29.6	0	0	0	1.5
Percentage of suitable habitat directly impacted by unauthorized routes/Open Areas, parking, and staging areas added to the NFTS.	0.09 %	0.006 %	0 %	0.001 %	0.007 %
Number of NFTS roads with a year-round closure proposed for a season of use change within 325 feet of suitable stream and pond/lake habitat.	0	13	0	21	22
Miles of NFTS roads with a year-round closure proposed for a season of use change within 325 feet of suitable stream and pond/lake habitat.	0	7.7	0	12.2	12.8

¹ Alternative 1 is calculated as an estimate of the total number and miles of unauthorized routes / acres of Open Areas, parking, and staging areas that have been inventoried (2005) in cross-country travel areas (including areas closed to cross-country (Figure 1-3)) in order to display a comparison between alternatives.

Cumulative Effects Unique to this Species

Cumulative impacts have likely contributed to the decline in WPT numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the direct and indirect effects evaluated for WPT and Effects Common to all Aquatic Wildlife discussion, there are 4 HUC8 subdrainages that were evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within these subdrainages, 69 unauthorized routes (8.67 miles) have been inventoried intersecting the 2079.7 acres within 325 feet potential suitable WPT habitat. These unauthorized routes, as well as roads within the HUC8s represent less than 1 percent of suitable habitat for WPT subject to indirect affects related to unstable stream channels across the Forest.

Addition of unauthorized routes in these subdrainages along with cumulative effects discussed would increase the potential of direct, indirect and cumulative effects to the WPT and its habitat.

Summary of Effects Analysis across All Alternatives

The Western pond turtle (WPT) is a Forest Service sensitive species whose distribution is from sea level to 4,690 feet in elevation (Jennings and Hayes 1994). Direct, indirect and cumulative effects from **Alternatives 3** *will not affect* the WPT (*No Effect*) and could have beneficial impacts. **Alternatives 2, 4 and 5** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the WPT*. Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to WPT. **Alternative 1** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the WPT*. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record.

Yosemite Toad – Affected Environment

Species and Habitat Account

The original range of the Yosemite toad (YT) extends from Ebbett's Pass in Alpine County to south of Kaiser Pass and Evolution Lake in Fresno County (Karlstrom 1962, 1973; CDFG 2005) above 6000 feet elevation. However, forestwide protocol level inventories conducted between 2002 and 2004 found populations as far south as Spanish Mountain, located in the Monarch Wilderness along the southern most portion of the SNF

This species was inventoried for occurrence between 2002 and 2004 across the SNF. Before 2002, visual encounter surveys and incidental sightings were documented in several locations throughout the forest. Currently on the SNF there are over 300 locations known to be occupied by YT.

The Yosemite toad is a Federal candidate species and a Forest Service sensitive species. The USFWS found that listing was warranted as threatened or endangered for this species however the listing was precluded at the time based on other higher priority issues (67 FR 75834). The species is managed as sensitive by the Pacific Southwest Region of the US Forest Service (1998).

YT breed in shallow pools and small, slow moving, shallow streams usually in meadows (Martin 1992). Movement to and from breeding sites could be up to 0.56 miles including moving over extensive snowfields from over-winter hibernation sites in forested areas (CDFG 2005). Seasonal variation in home range size is considerable. Mullally (1953) estimated breeding sights of some toads to be about 20 feet, but suggested that individuals may travel long distances away from water (CDFG 2005). The CWHR highly suitable habitats (CDFG 2005) for this species are wet meadows that have short (< 12 inches) herbaceous plants with vegetation closures greater than 10 percent.

For the purposes of this analysis, YT meadow habitat was divided into 2 categories: occupied and suitable meadows. Occupied habitat were considered meadows inventoried from the 2002-2004 Forestwide survey and confirmed sightings from visual encounter surveys. Occupied habitat was buffered with a 0.60 mile dispersal area (CDFG 2005). Suitable meadow habitat was considered all meadows above 6000 feet elevation that were not currently occupied and were buffered with a 300 foot analysis area. These two analysis areas were merged for a total potential habitat area.

Yosemite Toad – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects (beneficial or adverse) to the YT by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS (including unauthorized routes and/or Open Areas, parking, and staging areas),
- Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 in Section 3.14.1), and
- Implementing project design features.

These actions may have direct and indirect effects on YTs through increasing or decreasing human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). In addition, YTs may be less susceptible to motorized travel management during early spring because breeding movements typically occur when roads or areas near breeding sites are primarily impassable due to snow. However, the dispersal and overwintering movements of adults and some juveniles are large (approximately 0.60 miles) making it possible that toads may have to cross roads when they are open to vehicle travel to reach preferred foraging or overwintering sites.

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the YT. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

Occupied habitat:

- Number of proposed unauthorized routes within 0.6 miles of known occupied habitat.
- Miles of unauthorized routes within 0.6 miles in known occupied habitat.
- Number of meadow crossings of proposed unauthorized routes in known occupied meadows.
- Miles of proposed route crossings on known occupied meadows.
- Number of proposed Open Areas, parking, and staging areas within 0.6 miles of known occupied habitat.
- Acres of Open Areas, parking, and staging areas within 0.6 miles of known occupied habitat.

Suitable habitat:

- Number of proposed unauthorized routes within 300 feet of suitable habitat.
- Miles of unauthorized routes within 300 feet of suitable habitat.
- Number of meadow crossings on proposed unauthorized routes in suitable habitat.

- Miles of proposed unauthorized route crossings on suitable habitat.
- Number of proposed Open Areas, parking, and staging areas within 300 feet of suitable habitat
- Acres of Open Areas, parking, and staging areas within 300 feet of suitable habitat.
- Percentage of occupied/suitable habitat directly impacted by unauthorized routes and Open Areas, parking, and staging areas added to the NFTS.
- Number of NFTS roads with a year-round closure proposed for a season of use change within potential (suitable or occupied) habitat.
- Miles of NFTS roads with a year-round closure proposed for a season of use change within potential (suitable or occupied) habitat

Alternative 1 – No Action

Cross-country Motor Vehicle Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1-3). About 80,565 acres of suitable and occupied habitat are located within the project area. Approximately 80 percent of the total suitable YT habitat is located within areas prohibited to cross-country travel shown in Figure 1-3. For the purpose of this analysis, route miles and Open Area acres inventoried from 2005 (including those inventoried in areas prohibited to cross-country travel) were calculated to get an approximate base number of miles/area that have been created as a result of cross-country travel (Table 3- 221). Within suitable YT habitat, approximately 541 unauthorized routes (61 miles) with 50 unauthorized routes crossing meadows and 665 Open Areas, parking, and staging areas (52.7 acres) have been inventoried. There are 227 unauthorized routes and numerous Open Areas, parking, and staging areas (Table 3- 221) inventoried in areas prohibited to cross-country travel.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and Open Areas, parking, and staging areas inventoried, as well potentially continue to create new routes / Open Areas, parking, and staging areas within the 80,565 acres of suitable habitat in the project area. Approximately 36,435 of the total suitable habitat acres are located in the Tamarack Dinkey Analysis Unit. The use of inventoried unauthorized routes and Open Areas, parking, and staging areas and the continued proliferation of new routes / Open Areas, parking, and staging areas would increase both direct and indirect effects to the YT individuals and habitat. Additional cross-country travel within YT dispersal habitat could also result in direct and indirect effects to adult and juveniles moving out to terrestrial habitat to find foraging areas or suitable over-wintering sights by being crushed or disturbed as they leave meadow habitat. No road maintenance or improvement plans for any unauthorized routes or Open Areas, parking, and staging areas created would also add to increasing direct and indirect effects to the YT and its habitat over the short and long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term.

Currently the potential for direct effects such as crushing or injuring YT from vehicles traveling on inventoried (2005) unauthorized routes and Open Areas, parking and staging areas located within suitable habitat accounts for less than 1 percent of the habitat analyzed.

Additions to the NFTS: There are no unauthorized routes or Open Areas, parking, and staging areas identified to add to the NFTS in Alternative 1, however, use of existing inventoried (2005) unauthorized routes and Open Areas, parking and staging areas would continue.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no changes to the current season of use on NFTS roads.

Project Design Features: There are no project design features implemented for this alternative because no changes are proposed to the NFTS.

Alternative 2 – Proposed Action

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 23 unauthorized routes and 1 Open Area within suitable or occupied YT habitat in the project area. Although 42 percent of inventoried (2005) unauthorized routes within occupied (169 unauthorized routes) or suitable (58 unauthorized routes) habitat were located within areas prohibited to cross-country travel (Figure 1-3), Alternative 2 would eliminate the potential use of approximately 80,000 total acres of occupied or suitable YT habitat across the Forest available to motor vehicles traveling cross-country and result in beneficial direct and indirect effects to the YT individuals and habitat. Implementation of this alternative would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to all life stages of YT from motorized travel over the short and long term.

Additions to the NFTS: Under this alternative, there are 10 unauthorized routes (1.4 miles), no meadow crossing and no Open Areas, parking, and staging areas proposed for addition to the NFTS within 0.6 miles of occupied YT habitat (Table 3- 221). In addition, there are 13 unauthorized routes (1.25 miles), no meadow crossings and 1 Open Area (3.1 acres) proposed for addition to the NFTS within 300 feet of suitable YT habitat (Table 3- 221). This alternative would have a beneficial effect to YT by excluding the use of approximately 58.35 miles (95.7 percent of total miles) of inventoried (2005) unauthorized routes within YT habitat and provide for natural recovery over the long term. Open Areas, parking and staging area access would be limited to the one proposed Open Area, parking, or staging area and those which are currently managed.

Short-term effects of adding these unauthorized routes to the NFTS could have some beneficial effects to YT habitat since these unauthorized routes would be brought up to NFTS road standards and maintained. This would reduce sediment entering habitat and inventoried (2005) unauthorized routes crossing meadow habitat would not be added to the NFTS. There would continue to be direct and indirect effects to some juveniles and adults and indirect effects to all life history stages of the YT and occupied or suitable habitat along proposed unauthorized routes.

Since there is a decrease in the number of unauthorized routes and Open Areas, parking, and staging areas proposed to be added to the NFTS within suitable YT habitat compared to Alternative 1, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes located within YT occupied/suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 24 NFTS roads (9.5 miles) currently closed year-round that are within occupied or suitable YT habitat are proposed for a new seasonal closure date (Table 3- 221). Roads would not be open until May 20th (suitable habitat) or between July 1st and August 15th for occupied habitat.

A wet weather closure on routes within suitable habitat should minimize direct and indirect effects to habitat by reducing the potential of native surface road sediment run-off and provide additional protection to YT emerging in the spring for breeding. Although opening roads within occupied habitat would likely increase potential disturbance to some YT adults and juveniles as they move into terrestrial habitats to enter torpor in the fall a later seasonal closure should reduce impacts to all life stages of YT and habitat associated with use of the road.

Project Design Features: Under this alternative, project design features on unauthorized routes within occupied or suitable YT habitat include: Blocking route at both ends, waterbars, slash placement, brushing, drainage improvements at proper spacing to limit erosion, rock/slash placement at waterbar outlets to prevent continuation of gullies, gully repair, improved drainage management and stream crossing improvements. Implementation of these project design features may result in short-term disturbance to some individual YT, but would limit route widening, reduce soil perturbation into meadows and streams and reduce sedimentation, providing some beneficial effects over the long term. For aquatic/riparian species design features on unauthorized routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record. For site specific aquatic/riparian species design features, refer to Appendix A of this document.

Alternative 3

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only NFTS roads. This would eliminate from approved use approximately 80,565 acres of suitable/occupied YT habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the YT. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to YT from motorized travel over the short and long term.

This alternative would have a beneficial effect on the YT and its habitat by excluding approximately 61 miles of inventoried unauthorized routes from authorized use in suitable or occupied YT habitat and allow for their natural recovery over the long term. Access to Open Areas, parking, and staging areas would be only those that are currently managed.

Additions to the NFTS: There are no unauthorized routes or Open Areas, parking, and staging areas proposed to be added to the NFTS in Alternative 3.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): Under this alternative, there are no changes to the current season of use on NFTS roads.

Project Design Features: No unauthorized routes or Open Areas, parking, and staging areas are proposed under this alternative; therefore, there are no project design features to be implemented.

Alternative 4

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 24 proposed unauthorized routes and 3 Open Areas, parking, and staging areas within occupied or suitable YT habitat in the project area. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 10 unauthorized routes (2.5 miles), no meadow crossings and 1 Open Area (1.5 acres) proposed for addition to the NFTS within occupied YT habitat (Table 3- 221). In addition, there are 14 unauthorized routes (1.71 miles), no

meadow crossings and 2 Open Areas, parking, and staging areas (3.14 acres) proposed for addition to the NFTS within suitable YT habitat. This alternative would have a beneficial effect by excluding use of approximately 56.79 miles (93.1 percent of total miles) of inventoried unauthorized routes within occupied or suitable YT habitat and provide for natural recovery over the long term. Direct and indirect effects would be similar to those described in Alternative 2.

Since there is a decrease in the number of unauthorized routes proposed to be added to the NFTS within occupied or suitable YT habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to habitat and individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within YT occupied/suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 24 NFTS roads (10.5 miles) currently closed year-round that are within occupied or suitable YT habitat are proposed for a new seasonal closure date (Table 3- 221). Roads would not be open until May 20th (suitable habitat) or between July 1st and August 15th for occupied habitat. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within occupied or suitable YT habitat include: waterbars, protection of meadow from sediment, deposition by slash placement, slash / groundcover to encourage deposition and prevent gullies, crossing improvements to minimize bank erosion, drain dips with equipment and ending a route at campsite, obliterating last approximately 250 ft down steep, sandy slope and rehab slope, including old route that is now a gully. Implementation of these project design features may result in short-term disturbance to some individual YT, but would limit route widening, reduce soil perturbation into meadows and streams and reduce sedimentation, providing some beneficial effects over the long term. For aquatic/riparian species design features on unauthorized routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record. For site specific aquatic/riparian species design features, refer to Appendix A of this document.

Alternative 5

Cross-country Motor Vehicle Travel: Cross-country travel would be prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to NFTS roads, 32 proposed unauthorized routes and 3 Open Areas, parking, and staging areas within occupied or suitable YT habitat in the project area. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Additions to the NFTS: Under this alternative, there are 14 unauthorized routes (3.4 miles), 0 meadow crossings and 1 Open Area (1.5 acres) proposed for addition to the NFTS within occupied YT habitat (Table 3- 221). In addition, there are 18 unauthorized routes (2.18 miles), 0 meadow crossings and 2 Open Areas, parking, and staging areas (3.16 acres) proposed for addition to the NFTS within suitable YT habitat. This alternative would have a beneficial effect by excluding use of approximately 55.42 miles (90.9 percent of total miles) of inventoried unauthorized routes within YT habitat and provide for natural recovery over the long term. Open Areas, parking, and staging areas would be limited to a total of three areas in addition to currently managed ones. Direct and indirect effects would be similar to those described in Alternative 2.

Since there is a slight increase in the number of unauthorized routes proposed to be added to the NFTS within suitable/occupied YT habitat compared to Alternatives 2 and 4, there would be an incremental increase in the direct and indirect effects to individuals within the project area. The potential for direct effects (crushing or injuring) from vehicles traveling on proposed unauthorized routes and Open Areas, parking and staging areas located within YT occupied/suitable habitat accounts for less than 1 percent of this habitat analyzed. This may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long term or result in a Federal listing or loss of viability.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1): In this alternative, 32 NFTS roads (11.3 miles) currently closed year-round that are within occupied or suitable YT habitat are proposed for a new seasonal closure date (Table 3- 221). Roads would not be open until May 20th (suitable habitat) or between July 1st and August 15th for occupied habitat. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Design Features: Under this alternative, project design features on unauthorized routes within YT habitat are described in Alternative 2 and 4.

Table 3- 221. Direct and Indirect Effects Indicators for Alternative 1 through 5 for the Yosemite Toad

Yosemite toad - Direct and Indirect Effects Indicators	Alt. 1¹	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed unauthorized routes within 0.6 miles of known occupied habitat.	286	10	0	10	14
Miles of unauthorized routes within 0.6 miles in known occupied habitat.	34.2	1.4	0	2.5	3.4
Number of meadow crossings of proposed unauthorized routes in known occupied meadows.	1	0	0	0	0
Miles of proposed route crossings on known occupied meadows.	0.16	0	0	0	0
Number of proposed Open Areas, parking, and staging areas within 0.6 miles of known occupied habitat.	378	0	0	1	1
Acres of Open Areas, parking, and staging areas within 0.6 miles of known occupied habitat.	29.6	0	0	1.5	1.5
Number of proposed unauthorized routes within 300 feet of suitable habitat.	255	13	0	14	18
Miles of unauthorized routes within 300 feet of suitable habitat.	26.8	1.25	0	1.71	2.18
Number of meadow crossings on proposed unauthorized routes in suitable habitat.	49	0	0	0	0
Miles of proposed route crossings on suitable habitat.	8.74	0	0	0	0
Number of proposed Open Areas, parking, and staging areas within 300 feet of suitable habitat.	287	1	0	2	2
Acres of Open Areas, parking, and staging areas within 300 feet of suitable habitat.	23.1	3.1	0	3.14	3.16
Percentage of occupied/suitable habitat directly impacted by unauthorized routes and Open Areas, parking, and staging areas added to the NFTS.	0.15 %	0.01 %	0 %	0.01 %	0.01 %
Number of NFTS roads with a year-round closure proposed for a season of use change within potential (suitable or occupied) habitat.	0	24	0	24	32
Miles of NFTS roads with a year-round closure proposed for a season of use change within potential (suitable or occupied) habitat.	0	9.5	0	10.5	11.3

¹ Alternative 1 is calculated as an estimate of the total number and miles of unauthorized routes / acres of Open Areas, parking, and staging areas that have been inventoried (2005) in cross-country travel areas (including areas closed to cross-country (Figure 1-3)) in order to display a comparison between alternatives

Cumulative Effects Unique to this Species

There are no subwatersheds over the upper Threshold of Concern (TOC) within this species range. Therefore there are no cumulative effects unique to this species. See Effects Common to all Aquatic Wildlife in this section.

Summary of Effects Analysis across All Alternatives

The Yosemite toad (YT) is an endemic species to the State of California and is found at high elevations in the Sierra Nevada Mountains. Currently the YT only occupies approximately 50 percent of their historic range (Lannoo 2005). Direct, indirect and cumulative effects from **Alternatives 3** will not affect the YT (*No Effect*) and could have beneficial impacts. **Alternatives 2, 4 and 5** may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the YT. Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to YT. **Alternative 1** may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the YT. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2010) located in the project record.

3.14.4 Aquatic Biota Management Indicator Species

For aquatic biota Management Indicator Species, there are two types of habitat (USDA-FS 2007) identified to be analyzed for impacts:

- Aquatic Habitat (Lacustrine/Riverine) (benthic macroinvertebrates);
- Wet Meadow Habitat (Pacific chorus frog).

The complete MIS report for the FEIS is part of the project record (Sanchez and Strand 2010).

Aquatic Habitat for Management Indicator Species

This section will summarize effects of the five alternatives on habitat for benthic macroinvertebrates, identified as the Management Indicator Species for aquatic habitat (USDA-FS 2007).

Lacustrine/Riverine Aquatic Habitat

The analysis area (summarized in Table 3- 222) drains approximately 1,243,200 acres and consists of perennial streams (1,605 miles) and third order (intermittent) streams (1,673 miles) for a total of approximately 3,277 miles. The analysis area includes an estimated 17,220 acres of lakes. Riparian Conservation Areas (RCAs) (USDA-FS 2001, 2004) extend for 300 feet on either side of a perennial stream and lake, while intermittent streams have 150 feet from both channel banks. There are a total of 377,278 acres of RCA in the analysis area. The Cumulative Watershed Effects Analysis (Gallegos 2009) identified 5 HUC8 subdrainages at-risk of a cumulative watershed effect. Aquatic habitat elements evaluated for effects are flow, sediment and water surface shade.

Table 3- 222. Aquatic Habitat within the HUC6 Subdrainage Forming the Analysis Area

HU6 (ac)	Streams (mi)		Lakes (ac)
	Perennial (mi) (order4+)	Intermittent (mi) (order 3)	
1,243,205	1,605	1,673	17,217

Flow is affected by climate, geology, elevation, aspect and topography. Trails and roads collect and transmit water during and following storm-events, thus represent an extension of the stream drainage system and possibly affect magnitude of peak flows. The density of unauthorized routes within Riparian Conservation Areas (RCAs) is the measure of analysis for Flow.

Sediment consists of both fine-sized substrate and coarse sand (< 2 mm) and is an element of stream balance. Altering of flow magnitude can disrupt the water/sediment transport equilibrium of a stream system. Water and associated sediment enters the stream network at crossings, thus crossings are of particular concern due to connectivity. The number of crossings within RCAs is the measure of analysis for sediment.

Loss of vegetation is associated with the development of roads and trails. Roads and trails within RCAs could influence water temperature as the amount sunlight reaching the water surface increases. The miles of unauthorized routes or proposed roads, trails and acres of Open Areas, parking and staging areas within RCAs serve as the indicator for possible effects to Water Surface Shade.

Indicators

For this analysis the aquatic habitat altered by the proposed alternatives for the project are evaluated including NFTS roads ,unauthorized routes or proposed roads or trails, and Open Areas, parking and staging areas. (Unauthorized routes are Alternative 1, proposed roads or trails are unauthorized routes proposed to be added to the NFTS in Alternatives 2, 4 and 5). Based upon the available literature, the following indicators were chosen (Table 3- 223):

Flow:

- Unauthorized routes / Proposed road or trail density within RCA (mi/mi²)
- Potential to change habitat quality

Sediment:

- Number of stream crossings with RCA for unauthorized routes/ proposed roads or trails
- Potential to change habitat quality

Water Surface Shade

- Unauthorized routes / Proposed road or trail miles of route within RCA
- Acres of Open Areas, parking, and staging areas within RCA
- Potential to change habitat quality

Effects to Habitat

Cross-country Motor Vehicle Travel: In Alternative 1 cross-country travel is allowed within RCA (except within areas described closed in the 1977 ORV Plan (Figure 3-1), and includes an estimated 2494 stream channel crossings within RCAs. Cross-country travel represents on-going effects to benthic macroinvertebrate habitat related to sediment. Alternative 3 would prohibit cross-country travel and not add any unauthorized routes or Open Areas, parking and staging areas to the NFTS system, thus represents the least impacts to aquatic habitat. Alternatives 2, 4, and 5 would permit 4WD, ATV, and motorcycle use only on designated roads and trails, which would reduce the amount of impact within RCAs relative to current conditions. While impacts on designated roads and trails may be more severe than those that occur from more dispersed use, it is anticipated they could be more effectively managed and mitigated. Restricting cross-country

travel would minimize the number of stream crossings and riparian impacts, and limit them to known areas that can be monitored and maintained.

Adding Unauthorized Routes or Open Areas, parking, and staging areas to the NFTS:

Measures/indicators of changes in Flow, Sediment, and Water Surface Shade are assessed by evaluating density of unauthorized routes or proposed roads and trails within RCAs, the number of crossings within RCAs, the miles of proposed roads and trails within RCAs, and the acres of Open Area, parking and staging areas within RCAs. There are about 3,100 miles of road and about 560 miles of inventoried (2005) unauthorized routes (Alternative 1) for a combined total of about 3,660 miles. Of this total, 1,091 miles of road and 180 miles of unauthorized routes are located within RCAs with a combined density within RCAs of 2.1 mi/mi² (1.8 for roads and 0.3 for unauthorized routes). There are 14,611 road stream crossings and 2,494 unauthorized route stream crossings, with 10,342 (8,749 road crossings and 1,592 unauthorized route crossings) located within RCAs.

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1 and assumption 4 Section 3.10.1):

Habitat factors (flow; sediment; and water surface shade) may be affected by proximity of roads and trails to aquatic systems, and by crossings which provide both connectivity and sites of sediment input. Alternatives 2, 4, and 5 include wet weather seasonal restrictions on native surface NFTS roads and trails, which would also affect use of proposed roads and trails. These alternatives would increase the number of roads closed to year-round use, but vary in the number of miles when closures would occur compared to the current condition (Alternative 1) or Alternative 3. There are currently year-round closures on 236 miles of road, with 80 of these miles located within an RCA. There are 1763 miles of road with no restrictions, with 774 miles located within and RCA. The overall effects from these changes would benefit aquatic habitat by providing more protection from sediment that is currently being generated by travel on wet native-surface roads. Reductions in sediment would maintain or improve aquatic habitat for benthic macroinvertebrates. Alternative 4 would provide a higher level of protection due to more year-round (167 miles) road closures within RCA, although Alternatives 2 and 5 also provide benefits compared to Alternatives 1 and 3.

The indicators for each alternative are shown below in Table 3- 223.

Table 3- 223. Indicators for Aquatic Habitat

Aquatic Element	Indicators ¹	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Flow	Unauthorized route/ proposed road or trail density within RCA (mi/mi ²)	0.31	0.02	0	0.02	0.04
	Potential to change habitat quality	Low/Moderate	Low	Low	Low	Low
Sediment	Number of stream crossings with RCA for unauthorized routes or proposed roads and trails	2494	235	0	188	361
	Potential to change habitat quality	Low/Moderate	Low	Low	Low	Low
Water Surface Shade	Unauthorized route/ proposed road or trail within RCA	179	9.7	0	11.2	21.7
	Acres of Open Areas, parking and staging areas within RCA	150	3.1	0	3.3	6.7
	Potential to change habitat quality	Low	Low	Low	Low	Low

¹Unauthorized routes are Alternative 1, proposed roads or trails are unauthorized routes proposed to be added to the NFTS in Alternatives 2, 4 and 5.

Lacustrine/ Riverine Habitat Affects Summary

Alternative 1 allowed cross-country travel within RCAs outside of areas described in the 1977 ORV Plan (Figure 1-3). For the purposes of this analysis, unauthorized route miles, crossings and Open Area, parking and staging area acres inventoried from 2005 (including those inventoried in areas prohibited to cross-country travel under the 1977 ORV Plan) were included in calculations related to Alternative 1 since they represent current conditions. Alternative 1 includes an estimated 150 acres of Open Areas, parking and staging areas in RCAs, 179 miles of unauthorized route and 2494 stream channel crossings within RCAs (23 miles of unauthorized route and 243 of these crossings are located within areas described in the 1977 ORV Plan as closed to cross-country travel (Table 3- 223). The current condition has the highest probability of affecting habitat quantity and quality primarily though sediment, which is reflected in five HUC8 subdrainages indicated to be at high risk of a cumulative watershed effect (Gallegos 2009). This could affect habitat quality for 29 stream miles and 1 acre of lake, which represents less than 0.9 percent of the potential aquatic/riparian species habitat evaluated within the HUC6 watersheds comprising the analysis area

For the Action Alternatives (2-5) it would be expected that any changes in flow and water surface shade would be too small to be measured, although locally changes in water surface shade could occur within Miami Creek basin related to channel instability and undermining of bank trees. The current conditions (Alternative 1) represent the highest potential for effects to habitat, primarily related to cross-country travel within RCAs (377,278 acres), Open Areas, parking and staging areas in RCAs (150 acres), miles of road within RCA (1091), miles of unauthorized route within RCA (179 miles), and the number of stream crossings within RCAs (2,494) (Table 3-

223). The miles of unauthorized routes and number of crossings within RCAs are more than 7 times greater than the most similar Action Alternative evaluated (Alt. 5). The current conditions (Alternative 1) have the highest potential of affecting habitat quality primarily through sediment, which is reflected in the five HUC8 drainages indicated to be at high risk of a cumulative watershed effect. This could affect habitat quality for 29 stream miles and 1 acre of lake, which represents less than 0.9% of the potential habitat evaluated for benthic macroinvertebrates within the HUC6 watersheds comprising the analysis area. Under the Action Alternatives, Open Areas, parking and staging areas proposed within RCAs would be 3.14 ac. for Alt. 2; 0 acres for Alt.3; 3.3 ac for Alt. 4; and 6.7 ac for Alt. 5. The Action Alternatives (2-5) represent lower potential for reductions in habitat quality through elimination of cross-country travel, adjustments to road and route season of use, along with fewer miles of routes, fewer stream crossings, and fewer areas within RCAs.

None of the Action Alternatives would alter the existing trend in the habitat or aquatic macroinvertebrates across the Sierra Nevada bioregion.

Wet Meadow Habitat for Management Indicator Species

This section will summarize effects of the five alternatives on habitat for Pacific tree frog, identified as the Management Indicator Species for wet meadow habitat (USDA-FS 2007).

Wet Meadow Habitat

There are approximately 10,295 acres of wet meadow habitat within the project analysis area (evaluated using GIS for HUC6 watersheds containing the ten analysis units).

Unauthorized routes and NFTS roads and trails can affect meadows and wetlands directly by encroachment and indirectly by altering surface and subsurface flow paths. Hydrologic alteration can result in changes to channel morphology, resulting in channel downcutting, over-widening and lowering of the water table. Effects to meadows were evaluated as the miles of proposed route within the meadow and multiplying by 8 feet (unauthorized routes analyzed have variable widths and 8 feet represents a maximum width scenario). Roads were evaluated using an 18-foot width template to estimate effects acres.

Indicators

For this analysis the acres of wet meadow habitat altered by the proposed alternatives for the project are evaluated including NFTS roads, unauthorized routes or proposed roads and trails, and Open Areas, parking and staging areas. (Unauthorized routes are Alternative 1, proposed roads and trails are unauthorized routes proposed to add to the NFTS in Alternatives 2, 4 and 5). Based upon the available literature, the following indicators were chosen (Table 3- 224):

- Miles of unauthorized routes or proposed roads and trails within wet meadow
- Acres of wet meadow affected by unauthorized routes or proposed roads and trails
- Miles of NFTS roads and trails within wet meadow
- Acres of wet meadow affected by NFTS roads and trails
- Acres of Open Areas, parking and staging areas in wet meadow
- Total Acres of affected wet meadow
- Percent of analysis area Pacific tree frog habitat affected (10,300 acres)
- Percent of bioregional Pacific tree frog habitat affected (66,000) acres

Effects to Habitat

Cross-country Motor Vehicle Travel: Cross-country travel represents effects to Pacific tree frog habitat related to soil disturbance and the water table. Under Alternative 1, cross-country travel could occur within 10,295 acres of wet meadow. Alternative 3 would prohibit cross-country travel and not add any unauthorized routes or Open Areas, parking and staging areas to the NFTS, thus represents the least impacts to wet meadow habitat. Alternatives 2, 4, and 5 close cross-country travel and would permit 4WD, ATV, and motorcycle use only on designated routes only. If access to meadow habitat occurred, design measures to reduce conflicts between routes and meadows were assigned (Appendix A). Prohibiting cross-country travel would reduce incidence of meadow encroachment by motor vehicles and associated impacts.

Additions to the NFTS: There are 12.3 miles of NFTS roads and trails affecting 26.8 acres of wet meadow habitat. There are no unauthorized routes or Open Areas, parking and staging areas (facilities) proposed for addition to the NFTS in Alternative 2-5 within wet meadow habitat (Table 3- 224).

Changes to the NFTS season of use, opening or closing roads, vehicle class (for vehicle class see assumption 1 Section 3.14.1 and assumption 4 Section 3.10.1): Alternatives 2, 4, and 5 have measures to limit the interaction of NFTS roads and trails and meadows. These alternatives would increase the number of roads closed to year-round use, but vary in the number of miles when closures would occur compared to the current condition (Alternatives 1 and 3). Wet weather seasonal closures further reduce the likelihood that a meadow would be impacted during times when soils moisture is high. The closures would help reduce effects from rutting and subsequent sedimentation that may occur when motorized traffic crosses or enters a meadow. Alternative 4 would provide higher levels of protection due to more year-round and seasonal road closures.

Table 3- 224 summarizes the analysis effects on habitat for Pacific tree frog from each alternative.

Table 3- 224. Indicator for Wet Meadow Habitat

Indicator ¹	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Miles of unauthorized routes or proposed roads and trails within wet meadow	2.8	0	0	0	0
Acres of wet meadow affected by unauthorized routes or proposed roads and trails	2.7	0	0	0	0
Miles of NFTS roads and trails within wet meadow	12.3	12.3	12.3	12.3	12.3
Acres of wet meadow affected by NFTS roads and trails	26.8	26.8	26.8	26.8	26.8
Acres of Open Areas, parking and staging areas in wet meadow	3.6	0	0	0	0
Total acres of affected wet meadow	33.3	26.8	26.8	26.8	26.8
Percent of analysis area Pacific tree frog habitat affected (10,300 acres)	0.32	0.26	0.26	0.26	0.26
Percent of bioregional Pacific tree frog habitat affected (66,000) acres	0.05%	0.041%	0.041%	0.041%	0.041%

¹Unauthorized routes are Alternative 1, proposed roads or trails are unauthorized routes proposed to be added to the NFTS in Alternatives 2, 4 and 5.

Wet Meadow Habitat Affects Summary

Alternative 1 (current condition) represents the most disturbance to wet meadow habitat, a combined 33 acres of unauthorized routes, Open Areas, parking, and staging areas and NFTS roads and trails. If a cumulative watershed effect were to occur within the five at-risk HUC8 subdrainages, there would be 45 acres of wet meadows potentially affected. If 78 acres of wet meadow habitat were to be negatively affected, it would represent effects to approximately 0.12% of bioregional habitat for Pacific tree frog (66,000 ac). The Action Alternatives (2-5) do not propose roads and trails across wet meadows or propose any Open Areas, parking and staging areas in that habitat. The primary impacts from the Action Alternatives are the 27 acres of road within meadows and represent effects to 0.04% of bioregional habitat for Pacific tree frog.

None of the Action Alternatives would alter the existing trend in wet meadow habitat across the bioregion.

Compliance with the LRMP and Other Direction

To assist with the Travel Management Planning process, FS Pacific Southwest Region entered into programmatic consultation with the United States Fish and Wildlife Service (USFWS) for motor vehicle route designation. On December 27, 2006, the USFWS issued a Letter of Concurrence for 14 National Forests in California, including the SNF. The Letter of Concurrence approved the Project Design Criteria (PDC) as outlined in the document entitled "Route Designation: Project Design Criteria for 'No Effect' or 'May Affect Not Likely to Adversely Affect' determination for TE Species – October 2006 version 1". Therefore, all actions proposed within a Travel Management Plan Alternatives (analyzed in detail) must comply with the PDC to reach a determination of "No Effect" or "May Affect Not Likely to Adversely Affect" for TE species or additional consultation must take place for concurrence.

There are two aquatic/riparian species on the SNF with PDC that are present or have suitable habitat within the project area: Lahontan cutthroat trout and California red-legged frog.

Lahontan Cutthroat Trout

The Lahontan cutthroat trout (LCT) was listed by the USFWS as an endangered species in 1970 (35 FR 13520). The listing was reclassified to threatened status in 1975 to facilitate recovery and management efforts and authorize regulated angling (40 FR 29864). Critical Habitat has not been designated on the SNF for the LCT (USFWS 1995). Project Design Criteria for route designation are:

USFWS Project Design Criteria (PDC)

1. Routes and areas do not cross any stream within the occupied range of LCT.
2. Route and areas are not located on active landslides and do not re-route surface water onto active landslides within watersheds that provide habitat for LCT.
3. Within watersheds that provide habitat for LCT, routes or areas do not have the potential to capture surface run-off and then deliver sediment into a stream.
4. Areas are located outside of Riparian Conservation Areas (RCAs) that are within watersheds that provide habitat for LCT.
5. Within watersheds that provide habitat for LCT, routes avoid RCAs.

PROJECT DESIGN CRITERIA COMPLIANCE

1. Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of unauthorized routes and stream crossings within the occupied subdrainages of LCT. This alternative would not comply with the LCT PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and would not add any unauthorized routes or stream crossings within the occupied subdrainages of LCT. Therefore, these alternatives would comply with the LCT PDC.
2. Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of unauthorized routes on active landslides nor would it prevent the creation of unauthorized routes that could potentially divert surface water onto active landslides within watersheds that provide habitat for LCT. Therefore, this alternative would not comply with the LCT PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and would not add any unauthorized routes on active landslides nor would they add any unauthorized routes that could potentially divert surface water onto active landslides within watersheds that provide habitat for LCT without further consultation with USFWS. Therefore, these alternatives would comply with the LCT PDC.
3. Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of unauthorized routes that may have the potential to capture surface run-off and then deliver sediment into a stream that provides habitat for LCT. Alternative 1 would not comply with the outlined PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and do not add any unauthorized routes that may have the potential to capture surface run-off and then deliver sediment into a stream that provides habitat for LCT. Therefore, these alternatives would comply with the LCT PDC.
4. Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of areas within RCAs in watersheds that provide habitat for LCT. Therefore, this alternative would not comply with the LCT PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and do not add any areas within RCAs in watersheds that provide habitat for LCT. Therefore, these alternatives would comply with the LCT PDC.
5. Alternative 1 would not prohibit cross-country travel; therefore, this alternative may result in the creation of unauthorized routes that do not avoid RCAs within watershed that provide habitat for LCT. Therefore Alternative 1 would not comply with the LCT PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and do not add any unauthorized routes within RCAs in watersheds that provide habitat for LCT. Therefore, these alternatives would comply with the LCT PDC.

LRMP Direction

Establish a 200-foot zone on each side of all reaches of the tributaries to Portuguese Creek and Cow Creek where Lahontan cutthroat trout currently occur on all Class I, II and III tributaries above those reaches. Apply the following standards for this project within this zone:

- No motor vehicles will be allowed off permanent roads except as authorized by permit or contract;
- Ephemeral channels may only be crossed with equipment after consultation with a fisheries biologist (Standard and Guideline #39)

LRMP COMPLIANCE

Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent vehicles from accessing areas off permanent roads (except as authorized by permit or contract).

Therefore, Alternative 1 would not comply with the above mentioned standards and guidelines. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and would not add any unauthorized routes or Open Areas, parking, and staging areas within LCT watersheds. Therefore, these alternatives would comply with the above mentioned standards and guidelines.

California Red-legged Frog

On May 23, 1996, the California red-legged frog was listed as a threatened species (61 **FR** 25813). On April 13, 2006 critical habitat was designated, but does not exist on the SNF (71 **FR** 19244). Project Design Criteria (PDC) for route designation are:

USFWS Project Design Criteria

1. Routes or areas do not have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog.
2. In suitable California red-legged frog habitat, routes avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams. Crossing approaches get the riders in and out of the stream channel and riparian area in the shortest distance possible while meeting the gradient and approach length standards.
3. Routes or areas do not cross any stream or waterbody within 500 feet of known occupied sites of California red-legged frog; and route or area is not within a distance of 500 feet from wetland (i.e. springs, wet meadows, ponds, marshes).
4. In habitat occupied by California red-legged frog, routes or areas do not have the potential to capture or divert stream flow. The approaches to stream crossings are down-sloped toward the stream on both sides.
5. Areas are located outside of RR and RCAs, meadows and wetlands, within California red-legged frog habitat.
6. No route or areas are within Critical Aquatic Refuges for California red-legged frog.

PROJECT DESIGN CRITERIA COMPLIANCE

The following paragraphs describe how each alternative complies (or not) with the USFWS Project Design Criteria. Each numbered paragraph responds directly to the associated design criteria.

1. Alternative 1 does not prohibit cross-country travel and currently may have several inventoried unauthorized routes that have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog. This alternative also does not prevent the creation of new routes that may not be consistent with the PDC. Therefore, Alternative 1 would not comply with the CRLF PDC. Alternatives 4 and 5 would prohibit cross-country travel but would add routes that may have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog. If these unauthorized routes are brought up to Forest standards, they should comply with the CRLF PDC. Alternatives 2 and 3 would prohibit cross-country travel and would not add any routes to the NFTS; therefore, this alternative would comply with the CRLF PDC (Table 3- 225).
2. Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes that avoid RCAs except where necessary to cross streams in suitable California red-legged frog habitat. Alternative 1 would not comply with the CRLF PDC. Alternatives 4 and 5 would prohibit cross-country travel but would add unauthorized

routes that do not avoid RCAs except where necessary to cross streams in suitable California red-legged frog habitat. These alternatives would not comply with the CRLF PDC (Table 3-225) and would need additional consultation with USFWS. Alternatives 2 and 3 would prohibit cross-country travel and would not add any unauthorized routes to the NFTS; therefore, this alternative would comply with the CRLF PDC.

3. There are no known occupied sites of California red-legged frog within the project area; therefore, all the project alternatives would comply with the CRLF PDC.
4. There are no known occupied sites of California red-legged frog within the project area; therefore, all the project alternatives would comply with the CRLF PDC.
5. Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of areas located outside of RR and RCAs, meadows and wetlands, within California red-legged frog habitat. Alternative 1 would not comply with the CRLF PDC. Alternative 5 would prohibit cross-country travel but would add areas that do not avoid RCAs except where necessary to cross streams in suitable California red-legged frog habitat. This alternative would not comply with the CRLF PDC (Table 3- 225) and would need additional consultation with USFWS. Alternative 2, 3 and 4 would prohibit cross-country travel and would not add any unauthorized routes to the NFTS in CRLF habitat; therefore, these alternatives would comply with the CRLF PDC.
6. There are no Critical Aquatic Refuges for California red-legged frog within the project area; therefore, all the project alternatives would comply with the CRLF PDC.

Table 3- 225. Unauthorized routes, Open Areas, parking, and staging areas Determined to be Inconsistent with USFWS Project Design Criteria for the California Red-legged Frog

		Route or Open Area is Proposed to be Added to the National Forest Transportation System		
Route Number or Open Area	PDC Consistency	Alternative 2	Alternative 4	Alternative 5
BP111	Inconsistent	No	Yes	Yes
AE-23	Inconsistent	No	No	Yes
Open Area BLUCYN4	Inconsistent	No	No	Yes
Open Area BLUCYN6	Inconsistent	No	No	Yes

The U.S. Fish and Wildlife concurred with the determination that the implementation of the SNF Travel Management Plan is “*not likely to adversely affect*” the CRLF (letter # 81420-2009-I-1302-1) and determined for each alternative (with the exception of the No Action Alternative (Alternative 1)) “further consultation on Alternatives 2-5 is not necessary, unless new information reveals effects of the proposed action that may affect listed species in a manner or to an extent not considered; or the project is modified in a manner that causes an effect to the listed species that was not considered; or a new species or critical habitat is designated that may be affected by the proposed action (USDI -USFWS 2009).”

For additional LRMP consistency checks to Standard and Guides outlined in this report refer to the Riparian Conservation Objectives Consistency Analysis in Appendix J.

CHAPTER 4 – CONSULTATION AND COORDINATION

The Forest Service consulted with the following individuals, Federal, State and local agencies, tribes and non-Forest Service persons during the development of this environmental impacts statement:

4.1 List of Contributors

At one time or another many more people than listed below contributed to this analysis, most notable but not listed, are several employees who accomplished many miles of field data gathering for soils, watershed and wildlife resources.

Name	Responsibility	Education	Years Experience
Management Team			
Edward C. Cole	Forest Supervisor, Sierra National Forest	B.S. Landscape Architecture	36 Forest Service
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Name	Responsibility	Education	Years Experience
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Dirk Charley	Tribal Relations	A.A. Liberal arts	31 Forest Service
Karen Miller	Cultural Resources	M.A. Anthropology B.A. Anthropology	18 Forest Service 4 National Park Service 5 Private
Aimee Smith	Range	B.S. Rangeland Science	14 Forest Service

Tribes Consulted

Big Sandy Rancheria

North Fork Mono Tribe

Picayune Rancheria

Cold Springs Rancheria

North Fork Rancheria

American Indian Council of Mariposa

Dunlap Band Of Mono Indians

Federal Agencies Consulted

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US Representatives George Radanovich and Devin Nunes

US Senator Diane Feinstein

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