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Department of
Agriculture

Forest
Service

Pacific Southwest Region

May, 2009

Draft Environmental Impact Statement

Motorized Travel Management (formerly Motorized Route Designation)

Klamath National Forest
California

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Motorized Travel Management Draft EIS
May 21, 2009

Draft Environmental Impact Statement

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Abstract: This Draft Environmental Impact Statement (DEIS) describes six alternatives, five of which propose changes to the National Forest Transportation System (NFTS) and would prohibit cross-country travel on the Klamath National Forest (KNF). These actions are needed in order to implement the 2005 Travel Management Rule (36 CFR Part 212, Subpart B) while providing for a diversity of motor vehicle recreation opportunities and providing motorized access to dispersed recreation opportunities on the KNF. The DEIS discloses environmental impacts associated with the proposed action, a no action alternative, and 4 additional action alternatives developed to meet the purpose and need and to respond to issues raised by the public.

Alternative 1 is the no action alternative. Under this alternative, no changes would be made to the current NFTS and there would be no cross-country travel prohibition. Current management plans would continue to guide project area management. 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.

Alternative 2 is the proposed action. It includes the prohibition of cross-country motorized travel, proposed changes to the existing NFTS including vehicle class and season of use, and the additions to the NFTS as described in the Notice of Intent (NOI) published October 7, 2008 (Volume 73, Number 195). It also includes a non-significant amendment to the Klamath Forest Plan to be consistent with the Travel Management Rule.

Alternative 3 meets the objective of prohibiting cross-country travel, but proposes no additions to the existing NFTS system of roads and trails. Alternative 3 also addresses three significant issues regarding maintenance costs, wilderness/quiet use, and natural resource impacts.

Alternative 4 responds to three significant issues regarding maintenance costs, wilderness/quiet use, and natural resource impacts by prohibiting cross-country travel and adding fewer routes to the NFTS than alternative 2.

Alternative 5 responds to a significant issue regarding access and motorized recreation opportunity. This alternative is based on corrections to the proposed action (see alternative 6) and proposed changes to the existing NFTS including vehicle class and season of use, additional routes, and mixed use to provide for more access and motorized recreation opportunity.

Alternative 6 is the refined proposed action. It is based on the original proposed action (alternative 2) which was developed to meet the purpose and need described in the October 7, 2008 Notice of Intent. It incorporates corrections of errors/omissions identified through further field reconnaissance and administrative review, and proposes changes to the existing NFTS including vehicle class and season of use, additional routes, and mixed use to provide for more access and motorized recreation opportunity.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decisionmaking process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. City of Angoon v. Hodel (9th Circuit, l986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Send comments to:	Jan Ford, Public Uses Staff Officer 1312 Fairlane Road Yreka, CA 96097-9549
Date comments must be received:	July 20, 2009

Summary of the Draft Environmental Impact Statement (DEIS)

Proposed Action

The Klamath National Forest (KNF) proposes the following actions:

1) Prohibit cross-country motor vehicle travel off designated National Forest Transportation System (NFTS) roads, motorized trails, and areas by the public except as allowed by permit or other authorization (excluding snowmobile use).
2) Make a non-significant amendment to the Klamath NF Land and Resource Management Plan (Forest Plan) to conform with the Travel Management Rule, Subpart B, by removing reference to OHV cross-country travel in the Forest Plan and including a Forestwide standard: "Prohibit motorized vehicle travel (with the exception of snowmobiles) off designated roads, trails and areas except as allowed by permit or other authorization."
3) Add 84 existing unauthorized routes (approximately 54 miles) to the National Forest Transportation System (NFTS) as roads open to the public for motorized vehicle use by vehicle class and season of use. Add approximately 24 miles (258 routes) of existing unauthorized routes to the NFTS as roads open to the public for motorized vehicle use to access dispersed recreation opportunities (e.g. river access, dispersed camping, etc.), by vehicle class and season of use.
4) Add 22 existing unauthorized routes (approximately 14 miles) to the NFTS as motorized trails open to the public for motorized vehicle use by vehicle class and season of use.
5) Allow motorized vehicle use on two areas (65 acres) where motorized vehicles would be allowed anywhere within those delineated areas.
6) Make the following changes to existing NFTS roads:
   - Allow non-highway legal vehicle use on approximately 88 miles[1] (24 routes) of the existing NFTS where such use is currently prohibited.
   - Prohibit non-highway legal vehicle use on approximately 10 miles (8 routes) of the existing NFTS where such use is currently allowed.
   - Open NFTS roads 41S10 and 40N51 to public use where such use is currently prohibited to enhance motorized recreation by creating a loop opportunity.

Proposed changes to existing NFTS roads are discussed in detail in the transportation section of chapter 3.

[1] After the NOI was published, this number was validated and should actually be 119 miles.

Significant Issues

Internal and external scoping identified the following significant issues which were used in developing the action alternatives. The significant issues include the following:

Table S - 1. List of significant issues

Issue Topic	Cause and Effect
1. Access and Recreation Opportunity	The proposed action unreasonably restricts motorized recreation use by prohibiting cross-country travel. The addition of 92 miles of unauthorized routes to the NFTS does not provide enough motorized public access or diversity of motorized recreational opportunity to Klamath National Forest lands, including loops, connecting scenic destinations, campgrounds, local services, watersheds, and low and high elevation areas.
2. Maintenance Cost	The NFTS is too large to provide adequate maintenance and administration, given the current maintenance backlog. No new roads should be created as existing roads are largely unmaintained.
3. Wilderness / Inventoried Roadless Areas (IRAs)	Some roads proposed for addition to the NFTS are in close proximity to wilderness or inventoried roadless areas. The designation of unauthorized routes near these areas would encourage incursion of motorized use into the wilderness, and impact the ability of people to enjoy a quiet recreation experience.
4. Resource Impacts	Many of the unauthorized routes proposed for addition to the NFTS are poorly located and will cause adverse impacts to plants, wildlife, water quality, soils, riparian areas, and other natural resources.

Alternatives Considered in Detail

The KNF developed six alternatives: the no action, the proposed action, and 4 other action alternatives to meet the purpose and need and respond to the significant issues listed above. The six alternatives considered in detail for this analysis are listed in Table S - 2 below. Complete details of the alternatives are found in chapter 2 of this document.

Table S - 2. List of alternatives considered in detail

Alternative 1: No Action Alternative	The no action alternative provides a baseline for comparing the other alternatives. Under the no action alternative, no changes would be made to the current NFTS and there would be no cross-country travel prohibition. Current management plans would continue to guide project area management. 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. Unauthorized routes would continue to proliferate and have no status or authorization as NFTS facilities. • **Adds No New NFTS Facilities** • **Does Not Prohibit Cross Country Motorized Travel.**
Alternative 2: Proposed Action	The proposed action was developed by an interdisciplinary team using input on public-identified inventoried unauthorized routes, maintenance level 1 roads, and mixed use on maintenance level 3 roads. It includes proposals to prohibit cross-country motorized travel, change the existing NFTS, and add to the NFTS as described in the Notice of Intent (NOI) published October 7, 2008 (Volume 73, Number 195). The proposed action is the proposed changes to the NFTS and the prohibition of cross country travel as described in the NOI published in the Federal Register on 10/7/08: • **Adds 22 unauthorized routes (14 miles) to the NFTS as motorized trails** • **Adds 258 unauthorized routes (24 miles) to the NFTS as roads to access dispersed recreation sites** • **Adds 84 unauthorized routes (54 miles) to the NFTS as roads** • **Opens 65 acres (2 areas) to cross-country travel** • **Allows 88 miles* (portions or all of 24 roads) of mixed use** • **Prohibits 10 miles (portions or all of 8 roads) of mixed use** • **Opens 9.96 miles (2 closed level 1) NFTS roads** • **Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition** *After the NOI was published, this number was validated and should actually be 119 miles.

Alternative 3: Cross-Country Travel Prohibition Only - No Changes to the Current NFTS	Alternative 3 would prohibit cross-country travel and proposes no new additions to the existing system of roads and trails. This alternative also provides a baseline for comparing the impacts of other alternatives that propose changes to the NFTS. Alternative 3 also responds to issues 2-4 (cost, maintenance, wilderness, quiet use, and natural resource impacts). • **Adds no new NFTS facilities** • **Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition**
Alternative 4: Maximize Quiet Recreation Opportunities	Alternative 4 responds to issues 2-4 (cost, maintenance, wilderness, quiet use, and natural resource impacts) by prohibiting cross-country travel and adding fewer routes to the NFTS. • **Adds 2 unauthorized routes (0.73 miles) to the NFTS as motorized trails** • **Adds 25 unauthorized routes (1.71 miles) to the NFTS as roads to access dispersed recreation sites** • **Adds 12 unauthorized routes (4.45 miles) to the NFTS as roads** • **Allows 119.25 miles (portions or all of 25 NFTS roads) of mixed use** • **Prohibits 7.66 miles (portions or all of 7 roads) of mixed use** • **Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition**
Alternative 5: Maximize Motorized Recreation Opportunities	Alternative 5 responds to issue 1 (access and motorized recreation opportunity). This alternative is based on the refined proposed action (alternative 6) with additional routes and mixed use to provide for more access and motorized recreation opportunity. • **Adds 33 unauthorized routes (21.77 miles) to the NFTS as motorized trails** • **Adds 206 unauthorized routes (30.56 miles) to the NFTS as roads to access dispersed recreation sites** • **Adds 29 unauthorized routes (16.69 miles) to the NFTS as roads** • **Opens 53 acres (2 areas) to cross-country travel** • **Allows 277.77 miles (portions or all of 33 roads) of mixed use** • **Prohibits 7.66 miles (portions or all of 7 roads) of mixed use** • **Opens 4.66 miles (1 closed level 1) NFTS roads** • **Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition**
Alternative 6: Refined Proposed Action	The original proposed action was developed to meet the purpose and need described in the October 7, 2008 Notice of Intent. Additional field reconnaissance and analysis of the existing data led to refinement of the proposed action. These refinements are discussed in detail in chapter 2: This alternative: • **Adds 30 unauthorized routes (18.42 miles) to the NFTS as motorized trails** • **Adds 164 unauthorized routes (26.30 miles) to the NFTS as roads to access dispersed recreation sites** • **Adds 26 unauthorized routes (14.58 miles) to the NFTS as roads** • **Opens 53 acres (2 areas) to cross-country travel** • **Allows 105.21 miles (portions or all of 21 roads) of mixed use** • **Prohibits 7.66 miles (portions or all of 7 roads) of mixed use** • **Opens 4.66 miles (1 closed level 1) NFTS roads** • **Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition**

Comparison of Alternatives

The table below compares the activities that would occur under each alternative.

Table S - 3. Comparison of alternatives

Activity		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Cross-Country Travel		No change from current management	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Forest Plan Amendment		No	Yes	Yes	Yes	Yes	Yes
Additions to the NFTS (roads)	**Roads added to access dispersed recreation sites (routes)**	0	258	0	25	206	164
	Roads added to access dispersed recreation sites (miles)	0	24	0	1.71	30.56	26.3
	Other roads added to provide a diversity of motorized recreation opportunities (routes)	0	84	0	12	29	26
	Other roads added to provide a diversity of motorized recreation opportunities (miles)	0	54	0	4.45	16.69	14.58
Motorized Trails Added (routes)		0	22	0	2	33	30
Motorized Trails Added (miles)		0	14	0	0.73	21.77	18.42
Motorized Use Areas added		None	Humbug; Juniper Flats	None	None	Humbug; Juniper Flats	Humbug; Juniper Flats
Motorized Use Areas added (acres)		0	65	0	0	53	53
Changes to the NFTS	**Allow Mixed Use (routes)**	0	24	0	25	33	21
	Allow Mixed Use (miles)	0	88[a]	0	119.25	277.77	105.21
	Prohibit Mixed Use (routes)	0	8	0	7	7	7
	Prohibit Mixed Use (miles)	0	10	0	7.66	7.66	7.66
	Open Closed Roads	0	2	0	0	1	1
	Open Closed Roads (miles)	0	9.96	0	0	4.66	4.66

a - After the NOI was published, this number was validated and should actually be 119 miles.

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Chapter 1 - Purpose of and Need for Action

1.1 Document Structure

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

- **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 ranking 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.** Preparers, Consultation, Distribution, Glossary, References, and Index: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement; lists agencies, organizations and individuals to which this document is being sent; and includes lists of commonly used acronyms, a glossary, references cited, and an index.
- **Appendices:** The appendices provide detailed information to support the analyses presented in the environmental impact statement.

Additional documentation, including more detailed analyses of project-area resources, can be found in the project planning record located at the Klamath National Forest Headquarters.

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 recreationists 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. Annual sales of ATVs and OHV motorcycles in California were the highest in the U.S. for the

last 5 years, and four-wheel-drive vehicle sales in California also increased by 1500 percent to 3,046,866 from 1989 to 2002.

Unmanaged motor vehicle use, particularly OHV use, has resulted in thousands of miles of unplanned roads and trails, erosion, watershed and habitat degradation, and impacts to cultural resource sites. Compaction and erosion are the primary effects of motor vehicle use on soils. Riparian areas and aquatic dependent species are particularly vulnerable to damage from motor vehicle use. Unmanaged recreation, including impacts from OHVs, is one of "Four Key Threats Facing the Nation's Forests and Grasslands" (USDA Forest Service, 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 5 step region-wide effort to "Inventory and designate OHV roads, trails, and any specifically defined open areas for motor vehicle travel 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), 36 CFR 212, Subpart B of the final Travel Management Rule requires designation of those roads, trails, and areas that are open to motor vehicle use on National Forests. Only roads and trails that are part of a National Forest Transportation System (NFTS) may be designated for motorized use. Designations are made by class of vehicle and, if appropriate, by time of year. Part 261 – Prohibitions, Subpart A (36CFR 261.13) of the final rule, prohibits the use of motor vehicles off designated roads, trails and areas, as well as use of motor vehicles on roads and trails that is not consistent with the designations.

On National Forest System (NFS) lands open to cross-country motor vehicle travel, unrestricted repetitive motor vehicle travel has resulted in unplanned and unauthorized routes and areas (roads, trails and areas). These roads, trails and areas were developed without agency authorization, environmental analysis, or public involvement and do not have the same status as NFTS roads and NFTS trails. Nevertheless, some unauthorized routes may be well-sited, provide excellent recreation opportunities for motorized and non-motorized recreationists, and may enhance the NFTS. Other unauthorized routes are poorly-sited and cause unacceptable environmental impacts. Only NFTS roads, NFTS trails and discrete, specifically delineated open areas can be designated for motor vehicle use. In order for an unauthorized road or trail to be designated for motor vehicle travel, it must first be added to the NFTS. In order for areas to be designated for motor vehicle travel, a discrete, specifically delineated space that is smaller, and in most cases much smaller, than a Ranger District must be identified.

Of the 1.68 million total acres on the Klamath National Forest, cross-country travel is currently allowed on approximately 1.2 million acres. However, due to steep terrain (> 35 percent slope) in many areas, there are only about 508,000 acres where cross-country travel by motor vehicles is practicable.

In 2005, the KNF completed an extensive inventory of unauthorized routes (roads and trails) on NFS lands open to cross-country travel by motor vehicles as described in the MOI. The KNF then used an interdisciplinary process to review the existing NFTS and the inventory of unauthorized routes to identify proposals for limited changes to the NFTS. This process included review of the KNF land and resource management plan, internal and external discussion, including extensive public collaboration workshops and input, and internal and external validation of the locations of unauthorized routes using the inventory maps. The travel management regulations provide for the incorporation of previous decisions regarding travel management. Roads, trails, and areas that are part of the existing KNF transportation system and open to motor vehicle travel will remain designated for such use except as described below under the proposed action. This proposal makes needed changes (vehicle class restrictions, additional motorized routes (roads and trails), opening closed roads etc.) to the KNF NFTS roads, NFTS trails, and/or areas on NFS lands in accordance with 2005 Travel Management Rule at 36 CFR Part 212, Subpart B.

In accordance with Subpart B of the Travel Management Rule (36 CFR §212.56), following a decision on this proposal, the KNF will publish a motor vehicle use map (MVUM) identifying all KNF NFTS roads, trails, and areas that are designated for motor vehicle use. The MVUM shall specify the classes of vehicles and, if appropriate, the time of year for which motor vehicle 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 and at the headquarters of the corresponding administrative unit and Ranger Districts of the National Forest System. The unauthorized routes (roads and trails) not included in this proposal are not precluded from future consideration for either removal from the landscape and restoration to the natural condition or addition to the NFTS and inclusion on an MVUM. Future decisions associated with changes to the NFTS and MVUM are dependent on available staff and resources and may trigger the need for additional environmental analysis, public involvement, and documentation.

Travel Management on the Klamath National Forest

The Klamath National Forest currently manages and maintains approximately 4,715 miles of NFTS roads and 787 miles of NFTS motorized trails. The Klamath National Forest Transportation System (NFTS) was developed over many decades to meet a variety needs including timber management, fuel treatment, access to private inholdings, fire control, utility management, special uses management and recreation. Other roads were acquired with past land exchanges or acquisitions. Harvesting of special forest products such as greenery, firewood, mushrooms and plants are among the many opportunities afforded by the NFTS.

The NFTS is managed and maintained to various road standards depending on management objectives. They range from paved roads to roughly graded high clearance roads, depending on the type of access necessary. In some cases, where public access is not needed, roads are “stored” for future management use. The NFTS is displayed on the Forest Transportation Atlas. The initial Forest Transportation Atlas consists of the maps, inventories and plans for forest transportation facilities and

associated information available as of January 12, 2001 (FSM 7711.2). Details concerning the management of individual roads and trails are maintained in the Forest Infrastructure database (INFRA).

In 2002, the KNF populated the INFRA database by examining previous records (maintenance plans, maintenance expenditures, existing road and trail atlases, forest maps, etc.) to capture the entire NFTS and transfer the necessary information into INFRA and verify the Forest Transportation Atlas. Roads or trails that had no record of being mapped or maintained for a specific use were not included in the NFTS.

Since then, adjustments to the Transportation Atlas and INFRA database have been made to correct errors and account for NFTS roads that were either newly constructed or overlooked in the 2002 effort. The current Forest Transportation Atlas identifies the existing NFTS and the management objectives for each transportation facility. Decisions regarding changes to the NFTS (new road construction, realignment, decommissioning, etc.) are subject to the National Environmental Policy Act (NEPA) and require public involvement and disclosure. The NFTS is always changing depending on resource needs and management concerns.

Management of the transportation system on the Klamath National Forest is a dynamic process. Implementation of this proposal and the subsequent designation of motor vehicle routes through publication of the MVUM is just one project, among many, that affects the Forest's transportation system. Numerous road actions have been accomplished through forest planning, vegetation management projects, watershed restoration projects, fuel treatment projects, and road management decisions. Over the last decade, the Forest has moved away from a commodity (timber) focus to one of ecosystem health and integrated vegetation management. In response to this shift, Forest Supervisors initiated a number of actions that reduce both road maintenance needs and deferred maintenance:

1) Forest Orders have reduced the number of miles of NFTS roads and trails available for motor vehicle travel, and in some cases restricted the season of use. Currently, the Forest has over 800 miles of road closed year-round and over 1,000 miles of road seasonally closed. Approximately 192 miles of road have been permanently decommissioned and removed from the NFTS.
2) Over the years, the Klamath National Forest has systematically addressed design of the low use, native surfaced roads (maintenance level 2) through a series of stormproofing projects. Currently 82 percent of these roads are outsloped, with rolling dips and reduced fills, which improves drainage and reduces the risk of gullying or washout. These actions have substantially reduced the need for heavy maintenance and reconstruction.
3) As large truck traffic has declined, around 220 miles of maintenance level (ML)3 roads have been downgraded to ML2, reducing maintenance requirements.
4) A variety of fish passage projects has resulted in culvert replacement and upsizing, reducing the risk of culvert blockage, downcutting and loss of fill material.

For a more thorough explanation of the Forest's NFTS and management strategies, refer to appendix C.

In addition to this proposal, ongoing efforts to manage motor vehicle travel on the KNF include reducing adverse environmental impacts associated with unauthorized motorized trails through various project-level planning efforts, and addressing impacts associated with the current NFTS through the Forest's road and trail maintenance program.

Implementation of this proposal and the subsequent designation of motor vehicle routes through publication of the MVUM are only one step in the overall management of the KNF NFTS.

Project Location:

This analysis considers the entire Klamath National Forest.

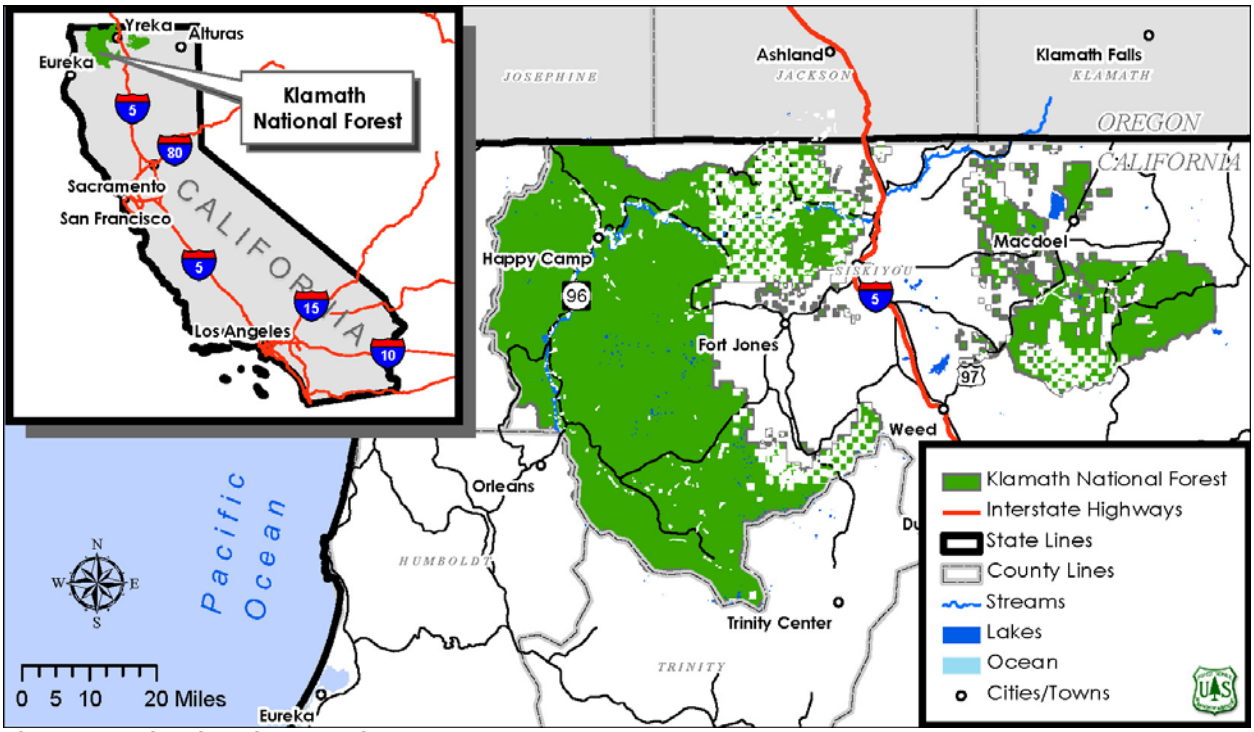

Figure 1. Project location overview map

1.3 Purpose and Need

The following needs have been identified for this proposal:

1) There is a need for regulation of unmanaged motor vehicle travel by the public. The proliferation of unplanned, unauthorized, non-sustainable roads, trails, and areas 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 NFS lands that are designated for motor vehicle use. After roads, trails, and areas 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.

2) There is a need for the Klamath Forest Plan to conform to the Travel Management Rule, 36 CFR 212, Subpart B. A review of the Forest Plan has found that it is not fully consistent with the Travel Management Rule, Subpart B. For example, the Klamath Forest Plan EIS states that off-highway vehicle use is allowed where it is not (1) legislatively restricted, (2) causing unacceptable resource damage, or (3) in conflict with other activities. The objective is to restrict use only where there is a demonstrated need. The Klamath Forest Plan includes standards and guidelines that prohibit or restrict OHV use in certain land allocations (e.g. research natural areas, backcountry areas), but OHV use is generally allowed in the other land allocations. About 70 percent of the Forest is open to unrestricted OHV use. These Forest Plan standards and guidelines are in conflict with the Travel Management Rule, at 36 CFR 212.50 (a) (Motor vehicle use off designated roads and trails and outside designated areas is prohibited by 36 CFR 261.13).
3) There is a need for limited changes to the Klamath National Forest transportation system to:
   a. Provide wheeled motorized access to dispersed recreation opportunities (camping, hunting, fishing, hiking, horseback riding, etc.). There is a need to maintain motor vehicle access to dispersed recreation activities that historically have been accessed by motor vehicles. A portion of known dispersed recreation activities are not located directly adjacent to an existing NFTS road or NFTS motorized trail. Some dispersed recreation activities depend on foot or horseback access, and some depend on motor vehicle access. Those activities accessed by motor vehicles consist of short spurs that have been created and maintained primarily by the passage of motorized vehicles. Many such 'user-created' routes are not currently part of the NFTS. Without adding them to the NFTS, the regulatory changes noted above would make continued use of such routes illegal through the prohibition of cross-country travel and would preclude access to many dispersed recreation activities.

   b. Provide a diversity of wheeled motorized recreation opportunities (4X4 vehicles, motorcycles, ATVs, passenger vehicles, etc.). It is Forest Service policy to provide a diversity of road and trail 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 motorized recreation opportunities relative to current levels. As a result, there is a need to consider limited changes and additions to the type of use permitted on existing NFTS roads as well as potential additions to the NFTS.

4) There is a need for socially compatible nonhighway-legal vehicle use in the vicinity of Hawkinsville where trespass, destruction of private property, and other use conflicts facilitated by the use of off-highway vehicles have become a problem. The Forest Plan specifies coordination of road management objectives with private landowners within the Forest (Forest Plan Standard and Guideline 20-3). Previous complaints from residential owners and comments during the Steps 1-3 for this project focused on needs for management changes on all or portions of Forest Roads 40N21, 43N30, 45N03X, 45N28, 45N29, 45N39, 46N16, and 46N16A.

In making any limited changes to the National Forest Transportation system, the KNF will be considering criteria contained in Subpart B of the Travel Management Rule, which include the following:

a. Impacts to natural and cultural resources.

b. Public safety.

c. Access to public and private lands.

d. Availability of additional resources for maintenance and administration needs of roads trails and areas 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 any limited changes to National Forest System Roads, the KNF will also consider the following:

a. Speed, volume, composition and distribution of traffic on roads.

b. Compatibility of vehicle class with road geometry and road surfacing

c. Maintaining valid existing rights of use and access (rights-of-way)

1.4 Proposed Action

1) Prohibit cross-country motorized vehicle travel (with the exception of snowmobiles) off NFTS roads, trails, and areas by the public except as allowed by permit or other authorization.
2) Make a non-significant amendment to the Klamath Forest Plan to be consistent with the Travel Management Rule (36 CFR Part 212, Subpart B), prohibiting cross-country motorized vehicle travel off designated NFTS roads and NFTS trails outside of designated areas by removing reference to OHV cross-country travel in the Forest Plan and including a forestwide standard: “Prohibit wheeled vehicle travel off designated roads and trails except for administrative use or uses under permitted activities or within designated areas.”

3) Add approximately 54 miles (84 existing unauthorized routes) of NFTS roads classified as open to all vehicle classes, both highway legal and non-highway legal, by season of use. The season of use for approximately 8 miles (14 routes) is from May 1 – October 31 (the remainder will be open year round). Add approximately 24 miles (258 existing unauthorized routes) to the NFTS as roads open to the public for wheeled motorized vehicle use to access dispersed recreation opportunities (e.g. river access, dispersed camping, etc.), by vehicle class and season of use. With these additions, roads open to all vehicle classes will total approximately 2618 miles.
4) Add approximately 14 miles (22 existing unauthorized routes) of NFTS motorized trails. This would bring the total of NFTS motorized trails to 15 miles. Approximately 2 miles of motorized trails would be classified as open for all trail class vehicles. About 4 miles of motorized trails would be classified as open for motorcycle only. The remaining 8 miles of motorized trails would be classified as open for vehicles 50 inches or less in width. The season of use for all 14 miles of trails is from May 1 – October 31.
5) Add two areas (Humbug [13 acres] and Juniper Flat [52 acres]) where use of motorized vehicles by the public would be allowed anywhere within the designated areas.
6) Make the following changes to existing Forest roads:
   a. Allow non-highway legal vehicle use on approximately 88[2] miles (24 segments) of existing NFTS roads where such use is currently prohibited.
   b. Prohibit non-highway legal vehicle use on approximately 10 miles (8 segments) of existing Forest roads where such use is currently allowed.
   c. Open Forest maintenance level 1 roads 41S10 (Doe Peak) and 40N51 (Yellowjacket Ridge) to public use where such use is currently prohibited.

A detailed description of the proposed action can be found in chapter 2 of this EIS. Maps depicting the proposed action can be found at http://www.fs.fed.us/r5/klamath/projects/ohv/index.shtml.

1.5 Principle Laws and Regulations Influencing 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

[2] After the NOI was published, this number was validated and should actually be 119 miles.

these are the Multiple Use and Sustained Yield Act of 1960, the National Forest Management Act of 1976 as expressed through the KNF Land and Resource Management Plan, the Clean Air Act of 1955, the Clean Water Act of 1948, and the Forest and Rangeland Renewable Resources Planning Act of 1974.

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

1.6 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 to prohibit cross-country motor vehicle travel by the public off the designated system and make limited changes to the KNF NFTS.

Responsible Official

The Forest Supervisor for the Klamath National Forest is the deciding official and will sign the Record of Decision.

1.7 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. The Forest used a variety of methods to keep the public informed of the route designation process. These methods included: public meetings/workshops, news releases, Forest web page updates, newsletters, phone calls, mailings, and presentations to a variety of service organizations, clubs, the county, tribes, and environmental interest groups. The Forest met with the public, Native tribes, local elected officials, community groups, and individuals since 2005 to discuss the Travel Management Rule and how it will affect travel on the Forest. In addition to individual meetings and discussions, three rounds of public workshops were held in 2005, 2007, and 2008 in communities throughout the planning area. These communities included Happy Camp, Greenview, Yreka, Orleans, and MacDoel. These workshops were held to share information, learn which routes were being used by the public, and assess the recreational value of all known routes. During this process, the public identified 400 miles of unauthorized roads 2,374 miles of NFTS roads, 74 miles of NFTS and unauthorized trails, and 52 acres of concentrated use areas, as being used. Information gathered through public involvement was used to assist the IDT in developing the proposed action.

Public scoping period for the Proposed Action

On October 7, 2008, the Forest Service published a Notice of Intent to Prepare an Environmental Impact Statement in the Federal Register (FR Volume 73, Number 195) for the Klamath National Forest Motorized Travel Management project, including a description of the proposed action. The public

comment period began on October 7, 2008, and was to have ended on November 6, 2008; however, the responsible official elected to extend the comment period by 30 days in order to ensure that all interested parties would have an opportunity to comment. Newsletters announcing and extending the comment period were mailed out to all potentially affected landowners and cooperators. The public scoping comment period ended on December 6, 2008. Additional documentation of public involvement can be found in the project planning record located at the Klamath National Forest Supervisor's Office in Yreka CA.

1.8 Tribal Consultation

Comments from and consultation with federally recognized and other tribes associated with the Klamath National Forest have been sought during travel management planning. The following ten tribal organizations received information and the opportunity to comment on the proposed action:

Karuk Tribe	Klamath Tribe	Quartz Valley Tribe
Pit River Tribe	Yurok Tribe	Hoopa Tribe
Shasta Indian Nation	Shasta Tribe, Inc.	Confederated Tribes of Siletz Indians
Confederated Tribes of Grand Ronde Community		

Further consultation with tribal governments is planned as this analysis continues.

1.9 Issues

Comments from the public, other agencies, and Native American representatives were used to formulate issues concerning the proposed action. An issue is 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, Forest Plan, 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 can be found in the project record located at the Klamath National Forest Supervisors Office in Yreka CA. The interdisciplinary team developed measurement indicators for each significant issue.

Significant Issues

Issue: The Proposed Action unreasonably restricts motorized recreation use by prohibiting cross-country travel.

The addition of 92 miles of unauthorized roads to the NFTS does not provide enough motorized public access or diversity of motorized recreational opportunity to Klamath National Forest lands, including loops, connecting scenic destinations, campgrounds, local services, watersheds, and low and high elevation areas.

Discussion: Concerns were raised that restricting cross-country travel across the entire forest severely impacts motorized recreation opportunities and unfairly restricts access for hunting, fishing, camping and a host of other outdoor activities. The route inventory identified 400 miles of public-identified unauthorized routes and the proposed action only retains 92 miles of these. This is insufficient to maintain a quality motorized recreation experience on the Klamath National Forest.

Indicators: The key indicators used to analyze this issue are:

- Acres of cross-country travel prohibition
- Miles of added unauthorized roads/trails and acres of areas and recreation opportunity
- Miles of mixed use added

Issue: The Forest's current NFTS is too large to provide adequate maintenance and administration, given the existing maintenance backlog.

No new roads should be created as current roads are largely unmaintained.

Discussion: Concerns were expressed that the roads currently on the Forest's NFTS are already inadequately maintained and patrolled. Increasing the number of miles open to motorized uses would result in an increased need for maintenance when there is already a backlog that is not being addressed. Additional Forest Service administration would be required to prevent unauthorized uses or resource damage, resolve user conflicts, and provide for public safety.

Indicators: The key indicators used to analyze this issue are:

- Miles of added unauthorized roads/trails and acres of areas
- Cost of maintaining routes added to the NFTS

Issue: Some roads proposed for addition to the NFTS are in proximity to wilderness or inventoried roadless areas.

The designation of unauthorized routes near these areas will encourage incursion of motorized use into the wilderness, and impact the ability of people to enjoy a quiet recreation experience.

Discussion: Concerns were raised that wildernesses and inventoried roadless areas on the Klamath National Forest are already impacted by motorized use. The proposed action only compounds this problem by adding motorized routes in proximity to these areas. Opportunities for solitude and non-motorized experiences will be disrupted by the noise of vehicles.

Indicators: The key indicators used to analyze this issue are:

- Number of unauthorized roads/trails proposed for addition to the NFTS within 0.5 miles of wilderness boundaries
- Number of miles of unauthorized roads/trails proposed for addition to the NFTS within 0.5 miles of wilderness boundaries
- Number of unauthorized roads/trails proposed for addition to the NFTS within inventoried roadless areas.

Issue: Many of the unauthorized roads proposed for addition to the NFTS are poorly located and would cause adverse impacts to plants, wildlife, water quality, soils, riparian areas and other natural resources.

Discussion: Commenters expressed concerns about impacts to a variety of natural resources, citing stream crossings, habitat fragmentation, wildlife disturbance, sedimentation, cultural resources, invasive weeds and other resources that would be impacted by motorized use of roads and trails.

Indicators: The key indicators used to analyze this issue are:

- Miles of unauthorized roads/trails and acres of areas proposed for addition to the NFTS in or adjacent to TES plant sites or suitable TES plant habitat
- Number of sensitive sites for TES wildlife species within 0.25 miles of an added route or area.
- Miles of motor vehicle routes and acres of area at forestwide scale and within the habitat for wildlife species groups.
- Miles of unauthorized roads/trails and acres of areas proposed for addition to the NFTS in or adjacent to TES aquatic biota habitat
- Density of motor vehicle routes as a measure of habitat effectiveness at the 7th field watershed level (average for each focal species group: wildlife and aquatic biota).
- Number of historic properties within unauthorized routes proposed for addition at risk from ongoing use.
- Risk of invasive weed spread

Non-significant Issues

Non-significant issues include those that are defined above as outside the scope of the proposed action; already decided by law, regulation, Forest Plan, or other higher level decision; irrelevant to the decision to be made; or conjectural and not supported by scientific or factual evidence. A list of non-significant issues raised during public scoping on the proposed action is included in the comment disposition table and can be found in the project record located at the Klamath National Forest Supervisors Office in Yreka CA.

Chapter 2 - The Alternatives

2.1 Introduction

This chapter describes and compares the alternatives considered for the Klamath National Forest Motorized Travel Management Environmental Impact Statement (EIS). It describes both alternatives considered in detail and those eliminated from detailed study. The end of this chapter presents the alternatives in tabular format so that the alternatives and their environmental impacts can be readily compared.

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

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 a summary comparison of the alternatives.
- Part 4 presents the alternatives that were considered, but eliminated from detailed analysis. It includes the rationale for eliminating these alternatives.

2.2 How the Alternatives were developed

The five action alternatives were developed to meet the purpose and need and address a range of issues as described in chapter 1. During the planning stages of the road designation project for the Klamath National Forest (KNF), members of the public recommended changes to the existing National Forest Transportation System (NFTS) with a focus on unauthorized routes. Comments regarding specific routes were also received during the public scoping period for the Notice of Intent (NOI). The interdisciplinary team (IDT) screened all the public-identified routes against a variety of resource criteria and identified those routes that had serious resource concerns. Most of those routes were eliminated from consideration in an alternative. Proposed routes were chosen by the responsible official based upon the purpose and need, the scope of the EIS, the issues raised by the public, and the resource concerns identified by the IDT.

Refining Alternatives Submitted by the Public during Scoping

During the 60 day public scoping process, alternatives were submitted for consideration by 2 groups. After the scoping period concluded, the Forest Service reviewed and gave due consideration to their proposals. The resulting alternatives incorporate these and other proposals and information 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.

2.3 Alternatives Considered in Detail

Five action alternatives (alternatives 2, 3, 4, 5, 6) and a no action alternative (alternative 1) are analyzed in detail in this DEIS. The no action alternative represents the continuation of cross-country travel. This alternative serves as a baseline for comparison among the alternatives, and is required by the implementing regulations of the National Environmental Policy Act (NEPA).

The project area for the alternatives includes National Forest System (NFS) lands on the KNF. It does not include any private, state, or other federal lands.

Each alternative assumes that other adjacent federal lands will be managed according to the existing management plans and applicable Federal laws. Each alternative also assumes that activities on state and private lands will meet applicable State and Federal land use regulations.

Monitoring Applicable to All Alternatives

Monitoring is critical for evaluating the effectiveness of management decisions, the accuracy of analysis assumptions, and conclusions. Monitoring of road and trail conditions is required, and must meet regional and national standards. If monitoring determines additional resource damage is occurring from wheeled motorized vehicle use, steps to prevent further damage may be taken. If the mitigations are not effective or are not possible, road or trail closures may be needed which could require additional NEPA analysis. Once a route is added to the NFTS as a road, it will be subject to the monitoring program used for the NFTS. Condition surveys are regularly performed on all ML 2, 3, 4, and 5 roads to assure road user safety. ML 1 roads are monitored as necessary for drainage and to ensure closure devices are intact. In addition to the formal condition surveys, the Forest will monitor road conditions continually as they are driven for other purposes. As problems are identified, they will be addressed as resources allow, and appropriate management actions will be undertaken in accordance with law, regulation and policy (such as emergency closures).

A separate monitoring effort will be applied to motorized trails and areas. At a minimum, 20 percent of the trails and one OHV area will be monitored every year to identify segments that lack adequate water

control or are experiencing damage to the facility (tread) and causing unacceptable off-trail effects on soil and water. The KNF intends to apply for grants from the State of California Off-Highway Motor Vehicle Recreation Division to supplement appropriated funds for maintenance. If the grants are secured, monitoring will be conducted annually in compliance with standards set forth in the State's Off-Highway Motor Vehicle Recreation Grants and Cooperative Agreements Program Regulations.

Monitoring of potential effects to heritage sites will be conducted as prescribed in the Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, U.S.D.A. 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 (Motorized Recreation PA). For action alternatives, establishment of baseline data through long term monitoring will be completed per recommendations in the PA.

As soon as practical after the completion of this plan, a motor vehicle use map (MVUM) will be created and made available to the public at no cost. This map is the legal document designating which routes on the Forest may be legally traveled with a motorized vehicle, by what type of vehicle, and any seasonal or other use restrictions. Designations, use restrictions, and operating conditions may be revised in future decisions as needed to meet changing conditions or management strategies. As changes or corrections are made to the transportation system, the MVUM will be periodically revised and reissued.

Mitigations Applicable to All Alternatives

- All NFTS roads and trails that are available for public use will be signed on the ground with a road or trail number and any regulatory information that may apply to the route. Where necessary for OHV areas, perimeter signing will be installed.
- Wilderness boundaries will be clearly signed when any road approaches within ¼ mile.
- Limited physical restoration, barricading, and naturalization treatments may occur at the point of closure for unauthorized routes. These actions are authorized under the action alternatives without further NEPA, as long as the following conditions are met:
    - Ground disturbance is limited to the currently impacted surface of the unauthorized road or trail, and is conducted using hand tools.
    - Natural materials, if needed for blocking or restoring the surface, are either gathered within close proximity (approximately 30 feet) of the route edge, or are imported from a site covered under a separate site-specific NEPA decision.

  - Adequate site clearance was conducted to ensure no natural or cultural resources will be negatively affected by the work in the immediate vicinity of the planned activities.

- Seasons of use will be implemented on some roads and motorized trails to accommodate a variety of resource concerns:
  - Wet weather conditions: April 16 – October 14
  - Critical deer winter range: May 1 – October 30
  - Public Safety – separation of uses (snowmobiles and wheeled vehicles): May 1 – December 25
  - Swainson's hawk nest site - August 16 - April 14
- Newly-designated roads and motorized trails will be brought up to standard (where necessary) prior to use by the public. Such activities may include surface repair, brushing out, construction of drainage structures such as water bars or rolling dips, and grading. All work will be confined to the existing disturbed route. The details on the routes and mitigations are listed in appendix A.
- Routes through ultramafic rock proposed for mixed use will be tested for the presence of asbestos. If asbestos is present, Klamath National Forest will provide information to the public regarding safe use of the roads and methods for reducing exposure.

Implementation of the above work would not preclude future management decisions made after conducting appropriate site-specific analysis under NEPA (such as converting a NFTS road or trail to a mountain bike trail or more extensive decommissioning of the route, using heavy machinery, etc.), if the need for such actions was deemed necessary.

Descriptions of the Alternatives

This section describes each of the six alternatives considered in detail. Each alternative is described in six parts:

1) Prohibition of cross-country travel: All of the action alternatives prohibit wheeled motor vehicle travel off designated NFTS roads, NFTS motorized trails, and areas by the public except as allowed by permit or other authorization. Prohibition of cross-country travel is included in order to address the need to regulate unmanaged motor vehicle use.
2) Forest Plan Amendment: All of the action alternatives include a non-significant amendment to the Klamath NF Land and Resource Management Plan (LRMP) to address the need to conform with the Travel Management Rule, Subpart B (36 CFR 212). The amendment includes the following components:

- Amend forestwide standard and guideline 12-11 to read: "Prohibit motorized vehicle travel (with the exception of snowmobiles) off designated roads, trails and areas except as allowed by the motor vehicle use map, permit, or other authorization."
- Amend Table 4-1 to read "OHV Areas (acres), Roads and Trails (miles)", and include the number of acres and miles available to OHV use from the selected alternative.

3) **Addition of Unauthorized Routes as Roads**: Some action alternatives would add unauthorized routes as roads to the NFTS by vehicle class and season of use. Additions are considered in order to respond to the need to provide motor vehicle access to dispersed recreation opportunities and to provide a diversity of motorized recreation opportunities. For purposes of this analysis, each of these roads and trails is identified by a unique number. All road additions have a proposed road management objective (RMO). Each road is individually addressed in appendix A.
4) **Addition of Unauthorized Routes as Motorized Trails**: Some action alternatives would add unauthorized routes as motorized trails to the NFTS by vehicle class and season of use. Additions are considered in order to respond to the need to provide a diversity of motorized recreation opportunities. For purposes of this analysis, each of these roads and trails is identified by a unique number. All trail additions have a proposed trail management objective (TMO). Each trail is individually addressed in appendix A.
5) **Motorized Use Area Additions**: Some action alternatives include proposals of discrete, specifically delineated areas for motor vehicle use. Additions are considered in order to respond to the need to provide a diversity of motorized recreation opportunities. For purposes of this analysis, each proposed area is identified by name, location and size (acreage).
6) **Changes to NFTS**: a) Vehicle class - The action alternatives may include limited changes to the vehicle class allowed on existing NFTS roads and/or trails. Vehicle class indicates the type of vehicle (passenger car, motorcycle, all-terrain vehicle, etc) allowed to operate on a road or trail. Some alternatives may add vehicle classes to roads and/or trails where that use is currently prohibited. Some alternatives may remove vehicle classes from roads and/or trails where that use is currently allowed. These changes respond to the need to provide a diversity of wheeled motorized recreation opportunities and access. b) Opening closed roads – Some alternatives include opening two NFTS roads to public use where such use is currently prohibited to enhance motorized recreation by creating a loop opportunity. These changes respond to the need to provide a diversity of wheeled motorized recreation opportunities and access.

Alternative 1: No Action

The no action alternative provides a baseline for comparing the other alternatives. Under the no action alternative, no changes would be made to the NFTS and there would be no prohibition of cross-country travel (see Table 1). Current management plans would continue to guide project area management. The Travel Management Rule would not be implemented, and no motor vehicle use map (MVUM) would be

published. Motor vehicle travel by the public would not be limited to designated routes. Unauthorized routes would continue to proliferate and would have no status or authorization as NFTS facilities.

1) **Cross-country travel**: Public wheeled motor vehicle travel off designated NFTS roads, NFTS trails, and outside designated motorized use areas would continue except as otherwise prohibited.
2) **Forest Plan Amendment**: The Klamath Forest Plan would not be amended to conform to the Travel Management Rule, Subpart B.
3) **Additions of roads**: No unauthorized routes would be added to the NFTS as roads under this alternative.
4) **Additions of motorized trails**: No additions would be made to the NFTS under this alternative.
5) **Motorized use area additions**: No motorized use areas would be added under this alternative.
6) **Changes to the NFTS**: a) Vehicle class - No change would be made to the NFTS vehicle class under this alternative. b) Opening closed roads – No roads currently closed would be opened.

Table 1. Alternative 1 - summary of actions

Action type		Action proposed
1. Cross-country travel		No Change From Current Management
2. Forest Plan Amendments		None
3. Additions of Roads to the NFTS	**a. Roads added to access dispersed recreation sites**	None
	b. Other Roads added to provide a diversity of motorized recreation opportunities	None
4. Additions of Motorized Trails to the NFTS		None
5. Motorized Use Areas added		None
6. Changes to the NFTS	**a. Vehicle Class**	No change from current management
	b. Opening Closed Roads	No change from current management

Alternative 2: Proposed Action

The proposed action was developed by an interdisciplinary team using input on public-identified inventoried unauthorized routes, maintenance level (ML) 1 roads, and mixed use on ML 3 roads. It includes proposals to prohibit cross-country motorized travel, change the existing NFTS, and add to the NFTS as described in the Notice of Intent (NOI) published October 7, 2008 (Volume 73, Number 195).

1) **Cross-country travel**: Public wheeled motor vehicle travel off designated NFTS roads, NFTS trails, and outside designated motorized use areas would be prohibited, except as allowed by permit or other authorization.
2) **Forest Plan Amendment**: The Klamath Forest Plan would be amended to conform to the Travel Management Rule, Subpart B.

3) **Additions of roads**: Under this alternative, 258 unauthorized routes would be added to the NFTS as roads to access dispersed recreation sites; 84 unauthorized routes would be added to the NFTS as roads to provide a diversity of motorized recreation opportunities.
4) **Additions of motorized trails**: 22 unauthorized routes would be added to the NFTS as motorized trails.
5) **Motorized use area additions**: 2 motorized use areas would be added under this alternative.
6) **Changes to the NFTS**: a) Vehicle class – i) vehicle class would be changed on portions or all of 24 roads from highway-legal only, to both highway-legal and nonhighway-legal allowed (allow mixed use). ii) vehicle class would be changed on portions or all of 8 roads from both highway-legal and nonhighway-legal, to highway-legal only allowed (prohibit mixed use). b) Opening closed roads – Two currently closed ML 1 roads would be opened.

Table 2 displays a summary of the actions proposed in this alternative. A complete listing of roads, trails, and areas to be added into the NFTS; including the vehicle class and, if applicable, seasonal use restrictions; can be found in appendix A. A map displaying this alternative is included in digital format on the CD attached to this document, and may be found in the project record located at the Klamath National Forest Supervisors Office in Yreka CA.

Table 2. Alternative 2 - summary of actions

Action type			Action proposed
1. Cross-country travel			Prohibited
2. Forest Plan Amendment			Amend Plan
3. Additions of Roads to the NFTS	**a. Roads added to access dispersed recreation sites**		24 miles
	b. Other Roads added to provide a diversity of motorized recreation opportunities		54 miles
4. Additions of Motorized Trails			14 miles
5. Motorized Areas added			65 acres
6. Changes to the NFTS	**a. Vehicle Class**	**i) Allow mixed use**	88 miles[a]
		ii) Prohibit mixed use	10 miles
	b. Opening Closed Roads		9.96 miles

a - After the NOI was published, this number was validated and should actually be 119 miles. Specialists analyzed all the proposed mixed use roads using the larger numbers, so the mileages listed in the Resource sections may conflict with this value.

Alternative 3: Cross-Country Travel Prohibition Only - No Changes to the Current NFTS

Alternative 3 would prohibit cross-country travel, and proposes no new additions to the NFTS. This alternative also provides a baseline for comparing the impacts of other alternatives that propose changes to the NFTS. None of the unauthorized roads, trails, or areas would be added to the NFTS. Alternative 3 also responds to issues 2-4 (cost, maintenance, wilderness, quiet use, and natural resource impacts).

1) **Cross-country travel:** Public wheeled motor vehicle travel off designated NFTS roads, NFTS trails, and outside designated motorized use areas would be prohibited, except as allowed by permit or other authorization.
2) **Forest Plan Amendment:** The Klamath Forest Plan would be amended to conform to the Travel Management Rule, Subpart B.
3) **Additions of roads:** No unauthorized routes would be added to the NFTS as roads under this alternative.
4) **Additions of motorized trails:** No unauthorized routes would be added to the NFTS as motorized trails under this alternative.
5) **Motorized area additions:** No motorized use areas would be added under this alternative.
6) **Changes to the NFTS:** a) Vehicle class - No changes would be made to the NFTS vehicle classes under this alternative. b) Opening closed roads – No roads currently closed would be opened.

Table 3 displays a summary of the actions proposed in this alternative. A complete listing of roads, trails and areas to be added into the NFTS; including the vehicle class and, if applicable, seasonal use restrictions; can be found in appendix A. A map displaying this alternative is included in digital format on the CD attached to this document, and may be found in the project record located at the Klamath National Forest Supervisors Office in Yreka CA.

Table 3. Alternative 3 - summary of actions

Action type		Action proposed
1. Cross-country travel		Prohibited
2. Forest Plan Amendment		Amend Plan
3. Additions of Roads to the NFTS	**a. Roads added to access dispersed recreation sites**	None
	b. Other Roads added to provide a diversity of motorized recreation opportunities	None
4. Additions of Motorized Trails		None
5. Motorized Areas added		None
6. Changes to the NFTS	**a. Vehicle Class**	No change from current management
	b. Opening Closed Roads	No change from current management

Alternative 4: Maximize Quiet Recreation Opportunities

Alternative 4 responds to issues 2-4 (cost, maintenance, wilderness, quiet use, and natural resource impacts) by prohibiting cross-country travel and adding fewer routes to the NFTS.

1) **Cross-country travel**: Public wheeled motor vehicle travel off designated NFTS roads, NFTS trails, and outside designated motorized use areas would be prohibited, except as allowed by permit or other authorization.
2) **Forest Plan Amendment**: The Klamath Forest Plan would be amended to conform to the Travel Management Rule, Subpart B.
3) **Additions of roads**: Under this alternative, 25 unauthorized routes would be added as roads to the NFTS for accessing dispersed recreation sites; 12 unauthorized routes would be added as roads to the NFTS to provide a diversity of motorized recreation opportunities.
4) **Additions of motorized trails**: Two unauthorized routes would be added as motorized trails to the NFTS.
5) **Motorized area additions**: No motorized use areas would be added under this alternative.
6) **Changes to the NFTS**: a) Vehicle class – i) Vehicle class would be changed on portions or all of 25 roads from highway-legal only, to both highway-legal and nonhighway-legal allowed (allow mixed use). ii) Vehicle class would be changed on portions or all of 7 roads from both highway-legal and nonhighway-legal, to highway-legal only allowed (prohibit mixed use). b) Opening closed roads – No currently closed roads would be opened.

Table 4 displays a summary of the actions proposed in this alternative. A complete listing of roads, trails and areas to be added into the NFTS; including the vehicle class and, if applicable, seasonal use restrictions; can be found in appendix A. A map displaying this alternative is included in digital format on the CD attached to this document, and may be found in the project record located at the Klamath National Forest Supervisors Office in Yreka CA.

Table 4. Alternative 4 - summary of actions

Action type			Action proposed
1. Cross-country travel			Prohibited
2. Forest Plan Amendment			Amend Plan
3. Additions of Roads to the NFTS	**a. Roads added to access dispersed recreation sites**		1.71 miles
	b. Other Roads added to provide a diversity of motorized recreation opportunities		4.45 miles
4. Additions of Motorized Trails			0.73 miles
5. Motorized Areas added			0 acres
6. Changes to the NFTS	**a. Vehicle Class**	**i) Allow mixed use**	119.25 miles
		ii) Prohibit mixed use	7.66 miles
	b. Opening Closed Roads		0 miles

Alternative 5: Maximize Motorized Recreation Opportunities

Alternative 5 responds to issue 1 (access and motorized recreation opportunity). This alternative is based on the refined proposed action (alternative 6), with additional routes and mixed use to provide more access and motorized recreation opportunity.

1) Cross-country travel: Public wheeled motor vehicle travel off designated NFTS roads, NFTS trails, and outside designated motorized use areas would be prohibited, except as allowed by permit or other authorization.
2) Forest Plan Amendment: The Klamath Forest Plan would be amended to conform to the Travel Management Rule, Subpart B.
3) Additions of roads: Under this alternative, 206 unauthorized routes would be added as roads to the NFTS for accessing dispersed recreation sites; 29 unauthorized routes would be added as roads to the NFTS to provide a diversity of motorized recreation opportunities.
4) Additions of motorized trails: 33 unauthorized routes would be added as motorized trails to the NFTS.
5) Motorized area additions: Two motorized areas would be added under this alternative.
6) Changes to the NFTS: A map displaying this alternative is included in digital format on the CD attached to this document, and may be found in the project record located at the Klamath National Forest Supervisors Office in Yreka CA.

Table 5 displays a summary of the actions proposed in this alternative. A complete listing of roads, trails and areas to be added into the NFTS; including the vehicle class and, if applicable, seasonal use restrictions; can be found in appendix A.

Table 5. Alternative 5 - summary of actions

Action type			Action proposed
1. Cross-country travel			Prohibited
2. Forest Plan Amendment			Amend Plan
3. Additions of Roads to the NFTS	**a. Roads added to access dispersed recreation sites**		30.56 miles
	b. Other Roads added to provide a diversity of motorized recreation opportunities		16.69 miles
4. Additions of Motorized Trails			21.77 miles
5. Motorized Areas added			53 acres
6. Changes to the NFTS	**a. Vehicle Class**	**i) Allow mixed use**	277.77 miles
		ii) Prohibit mixed use	7.66 miles
	b. Opening Closed Roads		4.66 miles

Alternative 6: Refined Proposed Action

The original proposed action was developed to meet the purpose and need described in the October 7, 2008 Notice of Intent. Additional field reconnaissance and analysis of the existing data led to refinement of the proposed action. These refinements include:

- Removing routes that are overgrown and/or show no sign of use, do not meet the purpose and need, do not meet policy, or are inaccessible.
- Removing an invalid polygon in T43N R4W S26 MDM.
- Correcting the designation of the Long Gulch road from a ML 3 NFTS road to a county road.
- Correcting the designation of road 40N51 from closed to open.
- Adding several unauthorized routes as roads and motorized trails to make loops.
- Extending the area of proposed mixed use on ML 3 roads to connect loops.
- Updating the number of roads and total mileage proposed for mixed use.
- Adding a season of use to the Humbug play area of May 1-October 31.
- Correcting the vehicle class for developed river access along Highway 96 to highway-legal only.

This alternative includes:

1) **Cross-country travel:** Public wheeled motor vehicle travel off designated NFTS roads, NFTS trails, and outside designated motorized use areas would be prohibited, except as allowed by permit or other authorization.
2) **Forest Plan Amendment:** The Klamath Forest Plan would be amended to conform to the Travel Management Rule, Subpart B.
3) **Additions of roads:** Under this alternative, 164 unauthorized routes would be added as roads to the NFTS for accessing dispersed recreation sites; 26 unauthorized routes would be added as roads to the NFTS to provide a diversity of motorized recreation opportunities.
4) **Additions of motorized trails**: Thirty unauthorized routes would be added as motorized trails to the NFTS.
5) **Motorized area additions:** Two motorized use areas would be added under this alternative.
6) **Changes to the NFTS:** a) Vehicle class – i) vehicle class would be changed on portions or all of 21 roads from highway-legal only, to both highway-legal and nonhighway-legal allowed (allow mixed use). ii) vehicle class would be changed on portions or all of 7 roads from both highway-legal and nonhighway-legal, to highway-legal only allowed (prohibit mixed use). b) Opening closed roads – 1 currently closed ML 1 road would be opened.

Table 6 displays a summary of the actions proposed in this alternative. A complete listing of roads, trails and areas to be added into the NFTS; including the vehicle class and, if applicable, seasonal use restrictions; can be found in appendix A. A map displaying this alternative is included in digital format on the CD attached to this document, and may be found in the project record located at the Klamath National Forest Supervisors Office in Yreka CA.

Table 6. Alternative 6 - summary of actions

Action type			Action proposed
1. Cross-country travel			Prohibited
2. Forest Plan Amendment			Amend Plan
3. Additions of Roads to the NFTS	**a. Roads added to access dispersed recreation sites**		26.3 miles
	b. Other Roads added to provide a diversity of motorized recreation opportunities		14.58 miles
4. Additions of Motorized Trails			18.42 miles
5. Motorized Areas added			53 acres
6. Changes to the NFTS	**a. Vehicle Class**	**i) Allow mixed use**	105.21 miles
		ii) Prohibit mixed use	7.66 miles
	b. Opening Closed Roads		4.66 miles

2.4 Comparison of Alternatives

This section of chapter 2 compares the alternatives by summarizing key differences between the alternatives and provides a summary of the effects analysis for all alternatives. Chapter 3 describes the environmental consequences of the alternatives in detail.

Table 7. Comparison of alternatives

Item		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Cross-country Travel		No change from current management	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Forest Plan Amendment		No	Yes	Yes	Yes	Yes	Yes
Additions to the NFTS (roads)	**Roads added to access dispersed recreation sites (routes)**	0	258	0	25	206	164
	Roads added to access dispersed recreation sites (miles)	0	24	0	1.71	30.56	26.3
	Other Roads added to provide a diversity of motorized recreation opportunities (routes)	0	84	0	12	29	26

Item		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
	Other Roads added to provide a diversity of motorized recreation opportunities (miles)	0	54	0	4.45	16.69	14.58
Motorized Trails Added (routes)		0	22	0	2	33	30
Motorized Trails Added (miles)		0	14	0	0.73	21.77	18.42
Motorized Use Areas added		None	Humbug; Juniper Flats	None	None	Humbug; Juniper Flats	Humbug; Juniper Flats
Motorized Use Areas added (acres)		0	65	0	0	53	53
Changes to the NFTS	**Allow Mixed Use (routes)**	0	24	0	25	33	21
	Allow Mixed Use (miles)	0	88[a]	0	119.25	277.77	105.21
	Prohibit Mixed Use (routes)	0	8	0	7	7	7
	Prohibit Mixed Use (miles)	0	10	0	7.66	7.66	7.66
	Open Closed Roads	0	2	0	0	1	1
	Open Closed Roads (miles)	0	9.96	0	0	4.66	4.66

a - After the NOI was published, this number was validated and should actually be 119 miles. Specialists analyzed all the proposed mixed use roads using the larger numbers, so the mileages listed in the Resource sections may conflict with this value.

2.5 Alternatives Considered But Eliminated from Detailed Analysis

Federal agencies are required by NEPA to rigorously explore and objectively evaluate reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 15.02.14). The following alternatives were submitted in response to the Notice of Intent and Proposed Action published in August 2008.

Alternative A: Add All Unauthorized Routes to NFTS

This alternative was developed in response to comments received during scoping (and from the public at open houses held in Siskiyou County prior to the NOI) from people who would like to add all unauthorized routes to the NFTS and/or permit cross-country travel. This alternative would add all of the unauthorized routes that were inventoried, and have no seasonal closures. All ML 3 roads would be designated for mixed use.

This alternative does not meet the purpose and need. Many of the inventoried unauthorized routes have resource conflicts and create a potential for resource damage if added to the NFTS and opened to public use. Adding all of the unauthorized routes would not meet the criteria of minimizing damage to soil, vegetation and other Forest resources. Similarly, many ML 3 roads are unsuitable for mixed use due

to safety reasons related to design, speed, or level of use. Leaving the Forest open to unrestricted cross-country use would not meet the needs of regulating public motor vehicle travel and conforming to the Travel Management Rule.

Alternative B: Allow motorized use of existing NFS non-motorized trails.

This alternative was developed in response to comments received during scoping from people who would like motorized use of existing NFS non-motorized trails, such as Trail Creek to Siphon Lake, Six Mile Trail, and Deacon Lee Trail.

This alternative does not meet the purpose and need. Adding motorized use to equestrian and foot trails would create conflicts between motor vehicles and existing recreational uses of NFS land, and create safety issues associated with those conflicts. In addition, the non-motorized trails were not intended for motorized use, and would require engineering review, design, and potentially significant reconstruction to accommodate that use.

Alternative C: Allow dispersed camping access along roads through the designation of buffers or corridors where cross-country travel would be permitted.

This alternative was developed in response to comments received during scoping from people who would like motorized access to camp away from the road, but not necessarily in a well established site.

This alternative does not meet the purpose and need. Because the Forest has an extensive road system, buffers would add a huge area where motorized use and potential resource damage would continue to occur, which is inconsistent with the need to regulate motorized use. The extent of analysis required for such a system is beyond the capability of the Forest, considering timeframes, cost and personnel.

Alternative D: Designate staging areas in addition to proposed routes and NFTS changes.

This alternative was developed in response to comments received during scoping from people who would like staging areas designated in addition to proposed routes and NFTS changes.

Designation of staging areas is outside the scope of this process. OHV users may stage from existing designated roads if they are within about 30 feet of the road. Separate staging areas would require construction, signing, and possibly other improvements. If needed in the future, such areas will be analyzed and authorized under separate analysis processes.

Alternative E: Allow cross-country motorized use off designated routes in order to retrieve legally taken big game animals.

This alternative was developed in response to comments received during scoping from people who would like to utilize motorized vehicles off designated routes to retrieve downed big game.

Allowing motorized off-road travel to any site where an animal is taken means that all lands on the Forest would be open to off-road vehicle use (for a specific purpose) during hunting season. While the period of use would be limited (+/- 8 weeks for rifle and archery seasons), the resulting impacts are considered to be similar to, but less intense than, those that would occur under the no action alternative.

Alternative F: Add more routes and mixed use.

This alternative was submitted by a local off-road riding group and local riders. This alternative would add more unauthorized routes and more mixed use than any action alternative. It would allow motorized use of two non-motorized NFS trails.

This alternative in its entirety does not meet the purpose and need. Routes proposed for addition to the NFTS and roads proposed for mixed use that meet the purpose and need were considered in the development of alternative 5. Many of the other unauthorized routes would not meet the criteria of minimizing damage to soil, vegetation, or other Forest resources; and conflicts between motor vehicles and existing recreational uses of NFS lands. In addition, the non-motorized trails were not intended for motorized use, and would require engineering review, design, and potentially significant reconstruction to accommodate that use. Many roads proposed for mixed use are unsuitable for simultaneous use by highway and nonhighway-legal vehicles due to safety reasons related to design, speed, or level of use.

Alternative G: Add fewer routes and decommission or close existing NFTS roads.

This alternative was submitted by environmental interest organizations. This alternative would decommission or close numerous NFTS roads and remove numerous unauthorized routes from the proposed action based on concerns for fisheries, wildlife, and citizen inventoried roadless areas.

This alternative in its entirety is outside the scope of the proposed action. Decommissioning NFTS roads is outside the scope because the project's purpose and need focuses on Subpart B of the Travel Management Rule. Alternative 4 adds fewer unauthorized routes than the proposed action due to fisheries, wildlife, and roadless area concerns.

Chapter 3 - Affected Environment and Environmental Consequences

3.1 Introduction

This analysis considers the entire Klamath National Forest (KNF), which is located primarily in Siskiyou County in northern California, with a portion (approximately 29,000 acres) in Jackson County, Oregon (see Figure 1). The 18,400 acre Butte Valley National Grassland (BVNG) is managed by the KNF, and is located near the east side of the Forest. Any changes in travel management on the KNF would also apply to the BVNG.

This chapter summarizes the physical, biological, social, and economic environments that are affected by the proposed action and alternatives (affected environment) and the effects on that environment that would result from implementation of any of the alternatives (environmental consequences). 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. The environmental consequences section forms the scientific and analytical basis for comparison of the alternatives, including the proposed action. This section discusses direct, indirect, and cumulative effects, along with applicable mitigation measures. 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.

Analysis Process

The environmental consequences presented here address the impacts of the actions proposed under each alternative for the KNF. This effects analysis was done at the site-specific and forest scales (the scale of the proposed action as discussed in chapter 1). Each affected road, trail, and area proposed in the alternatives has been reviewed by resource specialists. These findings are summarized in appendix A. Readers seeking information concerning the environmental effects associated with a specific road, trail, or area are directed to this appendix, where details concerning any mitigation measures or any other findings are documented.

For ease of documentation and understanding, the effects of the alternatives are described separately for three discrete actions and then combined to provide the total direct and indirect effects of each alternative (see below). The combination of the effects of these discrete actions is then added to effects of the past, present, and reasonably foreseeable actions in the cumulative effects analysis. The three 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 National Forest Transportation System (NFTS). As described above, the impacts of new facilities are addressed in sum total in this chapter, while impacts of individual routes or areas are addressed in appendix A. 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) impacts are presented.

3. Changes to vehicle class and/or season of use on the existing NFTS**.** Impacts caused by changes to vehicle class and season of use on the existing NFTS are described generally by alternative. For some impacts (for example public safety), impacts are also addressed by route.

Cumulative Effects

According to the Council on Environmental Quality (CEQ) NEPA regulations, "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 includes the entire KNF including private and other public lands that lie within the Forest 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, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions are considered to reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

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 and unduly costly to compile. 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 action 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 Council on Environmental Quality 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." Past actions are treated similarly in the recently published Forest Service Regulations for implementing the National Environmental Policy Act (36 CFR 220). For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Appendix B lists present and reasonably foreseeable future actions potentially contributing to cumulative effects. While the appendix lists all actions, every resource is not affected by every action. For example, a future project may affect wildlife but not affect water quality.

3.2 Affected Environment Overview

There are many aspects of the affected environment shared by all resources. 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 OHV use has resulted in unplanned roads and trails, erosion, watershed and habitat degradation, and impacts to cultural resource sites. On some Klamath 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. These routes generally developed without environmental analysis or public involvement, and do not have the same status as NFTS roads and NFTS trails included in the forest transportation system.

Assumptions and Limitations

1. No NEPA decision is necessary to continue use of the NFTS (i.e., OHV and transportation) as currently designated and managed under the no action alternative. These decisions were made previously.

2. Unauthorized or user-created roads, trails, and areas are not NFTS facilities. They are unauthorized. The agency never took action to create, manage, or construct them for public use. They were created by the public as a result of cross-country travel.

3. Temporary roads, trails, and areas built to support emergency operations or temporarily authorized in association with contracts, permits, or leases are not intended for public use. They are not NFTS facilities (e.g., they are unauthorized for public use). Any proposal to add these temporary roads to the NFTS will require a separate NEPA decision.

4. Any unauthorized routes not included in the proposed action are not precluded from consideration for addition to the NFTS in future travel management actions.

5. The Forest Service will continue to make changes to the NFTS on an as-needed basis. It will also continue to make decisions about temporary roads or trails on an as-needed basis associated with contract, permit, lease, or other written authorization.

6. Any activity associated with contract, permit, lease, or other written authorization is exempt from designation under the Travel Management Rule (36 CFR 212.51 (a) (8)) and should not be part of the proposal (i.e., fuelwood permits, motorized special use permits, etc.). Such actions are subject to separate NEPA analysis.

7. Designation is an administrative act which does not trigger NEPA. Designation technically occurs with printing of the motor vehicle use map (MVUM). NEPA is not required for printing a map.

8. For travel management, the Federal action triggering NEPA would be any changes to public access from those currently allowed or prohibited (i.e., prohibition of cross-country travel, changing vehicle class or season of use, or closures) and any additions of facilities (roads, trails, or areas) to the NFTS.

9. Previous decisions on the NFTS do not need to be revisited to implement an MVUM or the Travel Management Rule. That is, the NFTS consists of existing facilities that either underwent NEPA or predate NEPA. Continued motorized use of the system, in accordance with existing laws and regulations, does not require NEPA. Since designation is not a Federal action subject to NEPA (see #7), no NEPA is needed to designate an existing NFTS facility (road, trail, or area) when no changes to current use or management of that facility are proposed.

10. Dispersed camping, as well as any dispersed recreation activity, is not part of the scope of the proposed action. These activities are also not connected actions to travel management decisions because they can be undertaken independently of motorized travel (camping, hunting, fishing, hiking, etc.).

11. Assigning maintenance levels and changes to maintenance levels of roads or trails are administrative actions and not subject to NEPA. However, changes in allowed vehicle class, season of use, access, and proposals to maintain or reconstruct facilities are subject to NEPA.

12. Law enforcement capability and compliance – this action is being analyzed with the assumption that the majority of the public are compliant (based on field observations) and that compliance will increase with implementation of an MVUM.

13. The newly-designated routes will be signed, and all additions or changes to the NFTS will meet standards prior to availability for public use.

14. The NFTS will continue to be maintained according to the strategies outlined in the Public Uses (Roads) white paper in appendix C.

3.3 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 Draft Environmental Impact Statement (DEIS). Each of the following sections includes a summary of the report findings, including a description of the methodology used to determine impacts. The following reports and memoranda are incorporated by reference: botanical biological assessment and biological evaluation (BA and BE); BA and BE for fish; BA and BE for wildlife; socioeconomics report; and the heritage resources report. These reports or memoranda are part of the project record on file at the Forest Supervisor's Office in Yreka, California. Copies of these reports are available upon request by contacting Jan Ford, Project Leader, at 530-841-4483.

3.4 Route-specific Data

During the planning stages of the travel management project for the Klamath National Forest (KNF), members of the public recommended changes to the existing NFTS with a focus on unauthorized routes. Comments regarding specific routes were also received during the public scoping period for the notice of intent (NOI). The Forest developed route cards (appendix A) for all routes considered in alternatives 2, 3, 4, 5, and 6. For these routes, each route card identifies the alternative(s) under which the route is proposed, the type of vehicles allowed, and the season when the route would be open. It describes any mitigation measures that would be implemented on the route prior to publication on an MVUM and allowing public use.

3.5 Law Enforcement Assumptions Common to Effects Analyses

- Enforcement of the laws and regulations related to travel management will be enforced equally in authority and weight as with 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. It is anticipated there will be a higher number of violations to the Travel Management Rule the first few years and the number of violations will decline as the users understand and comply with the rules.
- Once the motor vehicle use map is published, the implementation of the established dedicated network of roads, trails, and areas with signs and user education programs, will reduce the number of motor vehicles traveling off of designated routes.
- Providing motorized recreation opportunities in popular, key areas will help relieve pressure to travel off of designated routes.

For more information about law enforcement, see appendix D.

3.6 Analysis Framework: Statute, Regulation, Forest Plan 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

The Forest Service is complying with the provisions of this law (see chapter 2 for how the Forest complies with the NFMA in its monitoring activities).

2005 Travel Management Rule 36 CFR 212

The Forest Service is complying with the provisions of this law (see the project file for a copy of the rule).

Wilderness Act of 1964

The actions proposed are in compliance with wilderness designations and the Wilderness Act of 1964. Motorized activity continues to be prohibited in wilderness under all the alternatives per the Wilderness Act of 1964.

3.7 Recreation

3.7.1 Introduction

Nearly all forest 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 forest. These visitors may be participating in motorized recreation, or using motor vehicles to access trailheads, facilities, destinations, or geographic areas that are used for non-motorized recreational activities. This section of the Travel Management DEIS 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 Klamath National Forest Land and Resource Management Plan (LRMP), and the Travel Management (TM) Rule.

3.7.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Regulatory direction relevant and specific to the proposed action as it affects recreation resources includes:

National Forest Management Act (NFMA)

The NFMA sets forth requirements for development of Forest Plans. The Klamath National Forest Land and Resource Management Plan includes standards and guidelines for management of recreation including use of off-highway vehicles.

Travel Management Rule, Subpart B (36 CFR 212.50-57)

(Criteria that incorporated E.O. 11644 and E.O. 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).

Klamath National Forest LRMP

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. Each class is defined in terms of its combination of activity, setting, and experience opportunities (ROS Users Guide USDA Forest Service, 1982). The intent is to use ROS and its associated settings to provide recreation input into LRMPs 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. For the purposes of travel management actions, ‘off-highway vehicles’ is applied to public 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 guidelines in the forest LRMP. On the Klamath National Forest, ROS is integrated into the management prescription and associated standards and guidelines in the forest LRMP and guide decisions and resource management activities.

The following forestwide standards and guidelines as stated in the LRMP which are relevant to travel management. Pages 4-25 to 4-38 state the following:

6-23 No new roads will be built in remaining unroaded portions of inventoried (RARE II) roadless areas in key watersheds.

12-1 Manage Forest resources to provide a broad range of recreational opportunities that meet changing recreational demands. Actively utilize the Forest's meaningful measures methodology for establishing recreation program standards, monitoring, and reporting accomplishments. Identify, develop, and conserve recreational opportunities within developed and dispersed settings. Eliminate or restrictively manage sites that receive minimal use; or, remove the facilities and manage them as dispersed spots. Develop a range of recreation opportunities within primitive, semi-primitive non-motorized, semi-primitive motorized, and roaded natural areas. As opportunities are identified for these areas, they should be managed to reflect the needs of a multi-cultural public. Provide a variety of sites to meet visitor preferences, needs and expectations to complement opportunities within the recreation emphasis area in which the site is located.

12-11 Restrict off-highway vehicle (OHV) use to protect key resource values and meet management objectives.

12-14 The Forest should manage the use of the existing trail system to serve the needs of recreationists in a condition that protects the resource and meets health and safety standards. Trails should be managed to accommodate all kinds of use, such as mountain biking and hiking. These recreational uses may not always be compatible and may require separation or restrictions based on management objectives.

12-15 Develop trail management objectives for all trails on the Forest. All trails in the Forest system should be inspected regularly to identify trail maintenance needs.

12-26 – ROS classes identified for management areas emphasize general direction for recreation management. Specific ROS criteria and conditions are subject to adjustment in order to achieve desired conditions.

In addition to the above forestwide standards and guidelines, each management area is assigned a ROS class or a range of ROS classes to guide decisions and resource management activities. The Forest ROS map displays the ROS class assigned to Forest lands in the LRMP. The Forest ROS map was used to determine if proposed route additions would meet the ROS class allocated to the management area. See the LRMP for standards and guidelines specific to each management area (USDA Forest Service, 1995).

3.7.3 Effects Analysis Methodology

Impacts Relevant to Recreation Include:

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

Assumptions Specific to Recreation Analysis:

- 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’ to travel off of designated routes.
- 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.

- 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.
- 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 developed motorized recreation opportunities (loops, connectors).
- Proposed changes and additions to the NFTS will have a beneficial effect on the amount of motorized access to dispersed recreation opportunities.
- The Forest's national visitor use monitoring (NVUM) report accurately expresses the most popular motorized and non-motorized recreation activities for use in this analysis.
- Overall changes in the NFTS that require non-significant plan amendment(s) will result in corresponding changes in the net semi-primitive non-motorized ROS class acres available on the Forest.
- The area of influence (dust, noise) of motorized use on populated areas or 'quiet recreation' opportunities is ½ mile from associated boundaries (e.g. wilderness, research natural area (RNA), property line, urban limit line).
- There has never been any use analysis of the unauthorized routes and no data exists (traffic counts, etc). As a result it would be highly speculative to make assumptions of use levels on the unauthorized routes.
- The majority of the motorized public use occurring on NFS land is occurring within the existing NFTS based on observation and NVUM data.
- Effects to inventoried roadless areas will be covered in the inventoried roadless areas and Roadless Characteristics section of the document
- A discussion of maintenance costs can be found in the Transportation section of the document.
- Impacts to other resources will be covered within their respective sections.

Data Sources:

- KNF LRMP for distribution of ROS classes as well as the recreation opportunity spectrum GIS data layer
- The Forest's NVUM report for most popular non-motorized and motorized recreation activities.
- Recreation Facility Analysis for the Forest's recreation program niche

- Recreation, law enforcement, and other resource staff observations.

Recreation Indicator Measures:

Indicator measures are intended to address how each alternative as the sum total of its proposed actions conforms to the LRMP, significant issues identified in scoping, and Subpart B of the Transportation Management Rule including: whether the motorized recreation opportunity has the potential to conflict with other recreation opportunities, specifically non-motorized opportunities; the proximity of motor vehicle use to populated areas or neighboring private and federal lands and wilderness areas; 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 amount of motorized access available on the unit. Conflicts with other resources (including air quality) are examined in other resource sections. Public safety is addressed in the transportation section.

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 or trails, indicator measures were used. Mileage available for each class of vehicle is useful in analyzing the ability of Forest users to not only travel around the Forest and enjoy motorized recreation opportunities; but also to access non-motorized recreation opportunities such as trailheads, hunting, and dispersed recreation sites for activities such as fishing and camping, which the forest has determined are 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 4WDs in each alternative. The changes to motorized mileages can be used to interpret the level of change in opportunities for motorized and non-motorized users. The details of the proposed seasonal closure relate to both the months that motorized recreation will not be allowed to use designated roads, trails or areas and, conversely, the time of year that conflicts between motorized and non-motorized uses will be minimized. Also, the effect on non-motorized recreation activities that are accessed by native surface roads is considered. Number of acres located ½ mile away from roads, trails and boundaries are used to analyze the opportunity for non-motorized and ‘quiet’ recreation on the Forest.

Measurement Indicator 1:

ROS consistency with LRMP

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 plan amendments (and or any associated changes to LRMP recreation and OHV management prescriptions) displayed by associated acreage changes in the LRMP by alternative. No ROS plan amendments would be needed for any alternatives because all routes proposed for addition to the NFTS comply with the ROS class in the associated management area. No proposed route additions in the action alternatives would be located in primitive or semi-primitive non-motorized ROS classes. All

proposed route additions would be located in semi-primitive motorized, roaded natural, or rural ROS classes. The number of ROS acres in each class would remain the same in each alternative.

Table 8. ROS acres in each class for all alternatives

ROS Class	All Alternatives - Acreage	Percent of total Forest acres
Primitive	202,800	12%
Semi-Primitive Non-Motorized	317,795	19%
Semi-Primitive Motorized	38,739	2%
Roaded Natural	841,711	50%
Rural	287,595	17%
Total	**1,688,640**	**100%**

Measurement Indicator 2:

Non-motorized recreation opportunity

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

Method: Number of acres within ½ mile of an area where motorized use is allowed (designated roads, trails and areas in the NFTS in miles that would result under each alternative). This method was determined through a literature review of sound studies and reports listed in chapter 4 of this document. Areas where motorized use is allowed (proposed or designated roads, trails and areas) were buffered by a distance of ½ mile. Areas outside of this buffer would be considered available for quiet recreation and non-motorized activities without the potential for use conflicts with motorized vehicles. The following table displays the number of acres within the ½ mile buffer or the acres affected by motorized use.

Table 9. Acreage within ½ mile of routes proposed for public use under each alternative as a measurement indicator of acreage affected by motorized use where quiet recreation and non-motorized activities may have potential use conflicts with motorized vehicles

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Acreage and % of Total Forest Acreage		Acreage	%	Acreage	%	Acreage	%	Acreage	%	Acreage	%
Route Additions only	224,871[a]	13.3[a]	111,993	6.6	0	0	11,790	0.7	104,697	6.2	94,314	5.6
All motorized routes traveling through the Forest [b]	1,103,106	65.2	1,086,968	64.3	1,084,625	64.1	1,084,659	64.1	1,085,795	64.2	1,085,598	64.2

a – Alternative 1 proposes no unauthorized route additions, however cross-country motorized travel would continue. Attempting to quantify where cross-country motorized travel occurs is speculative since it is impossible to predict exactly where, when, or how cross-country motorized use would occur. For consistency in comparing alternatives, the inventoried unauthorized OHV routes were used to determine the area potentially affected by cross-country motorized use. The inventoried unauthorized routes are not proposed as additions under alternative 1, but were used to display the minimum acreage affected by cross-country motorized travel.
b – Analysis of "All motorized routes traveling through the Forest" for alternative 1 included the inventoried unauthorized OHV routes, existing NFTS, adjacent national forest roads, and state, county, and private roads. Analysis of "All motorized routes traveling through the Forest" for the remaining alternatives included proposed route and area additions, existing NFTS, adjacent national forest roads, and state, county, and private roads.

Measurement Indicator 3:

Motorized recreation opportunity

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

Method:

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.

Areas: Number of acres in open areas by vehicle class and season of use.

Table 10. NFTS road mileage open to the public forestwide by alternative (class of vehicle and season of use). Mileages listed by class of vehicle and season of use include proposed unauthorized route additions and any closed NFTS roads proposed as open.

Class of Vehicle	Season of Use	Mileage Proposed to be Added to NFTS					
		1	2	3	4	5	6
Highway-legal Motorcycle	May 1 – October 31	0	7.29	0	0	0.68	0.33
	Yearround		80.67		6.16	51.23	45.21
Highway-legal 4WD	May 1 – October 31	0	7.29	0	0	0.68	0.33
	Yearround		80.67		6.16	51.23	45.21
Passenger Car	May 1 – October 31	0	7.29	0	0	0.68	0.33
	Yearround		80.67		6.16	51.23	45.21
Nonhighway-legal 4WD	May 1 – October 31	0	7.29	0	0	0.68	0.33
	Yearround		79.49		6.16	50.45	44.43
Nonhighway-legal ATV	May 1 – October 31	0	7.29	0	0	0.68	0.33
	Yearround		79.49		6.16	50.45	44.43
Nonhighway-legal Motorcycle	May 1 – October 31	0	7.29	0	0	0.68	0.33
	Yearround		79.49		6.16	50.45	44.43
Total Open to Nonhighway-legal Use	May 1 – October 31	0	7.29	0	0	0.68	0.33
	Yearround		79.49		6.16	50.45	44.43
Total Mileage – proposed route additions and closed NFTS roads proposed as open		0	87.96	0	6.16	51.91	45.54
Total Motorized Mileage in Alternative[a]		3,753	3,827.96	3,753	3,746.16	3,797.91	3,785.54

a - Total Motorized Mileage in alternative includes proposed route additions mileage and motorized NFTS mileage (Operational maintenance levels (ML) 2-5)

Table 11. NFTS road mileage open to the public forestwide – total mileage of proposed mixed use by alternative (class of vehicle and season of use). Mixed use would occur on existing NFTS roads. Existing NFTS roads where mixed use is proposed or currently allowed would be available for use by all vehicle classes listed in Table 10.

Class of Vehicle	Season of Use	NFTS Mileage Proposed for Mixed Use					
		1	2	3	4	5	6
Mileage Proposed Mixed Use – open to highway-legal and nonhighway-legal vehicles [a]	Year-round	0	119	0	119.25	277.77	105.21
Mileage Remove Mixed-Use – open to highway-legal vehicles only [b]	Year-round	0	10		7.66	7.66	7.66
Total Motorized Mileage available for mixed use in Alternative [c]	Year-round	2,746	2,865	2,746	2,867.59	3,127.11	2,853.55

a – Mileage proposed for mixed use where such use is currently prohibited
b – Mileage proposed to remove mixed use where such use is currently allowed
c – "Total Motorized Mileage available for mixed use in alternative" was determined by adding the proposed mixed use mileage and mileage currently available for mixed use (Operational ML 2 on existing NFTS) and minus the mileage where mixed use would be removed.

Table 12. NFTS trail mileage open to the public forestwide by alternative (class of vehicle and season of use)

Class of Vehicle	Season of Use	Mileage Proposed to be Added to NFTS					
		1	2	3	4	5	6
Highway-legal High-Clearance 4WD	May 1 – October 31	0	1.91	0	0.73	4.49	4.49
Dual Sport Highway-legal Motorcycle	May 1 – October 31	0	14	0	0.73	21.77	18.42
Nonhighway-legal 4WD	May 1 – October 31	0	1.91	0	0.73	4.49	4.49
Nonhighway-legal Motorcycle	May 1 – October 31	0	14	0	0.73	21.77	18.42
Nonhighway-legal ATV	May 1 – October 31	0	10.20	0	0.73	17.95	14.81
Total Mileage in Alternative – Proposed Trail Route Additions		0	14	0	0.73	21.77	18.42

Note: This table summarizes proposed trail route additions only since no existing NFTS trails are designated for motorized use. All proposed trail route additions have a season of use of May 1-October 31. No proposed trails are open year-round.

Table 13. NFTS trail mileage open to the public forestwide by alternative by degree of difficulty

Class of Vehicle	Degree of Difficulty	Mileage Proposed to be Added to NFTS					
		1	2	3	4	5	6
Highway-legal High-Clearance 4WD	Easy	0	1.20	0	0.29	4.05	4.06
	Moderate		0.44		0.44	0.44	0.44
	Difficult		0		0	0	0
	Extremely Difficult		0.27		0	0	0
Dual Sport Highway-legal Motorcycle	Easy	0	4.56	0	0.29	7.61	7.40
	Moderate		3.10		0.44	5.87	5.20
	Difficult		6.04		0	8.29	5.82
	Extremely Difficult		0.27		0	0	0
Nonhighway-legal 4WD	Easy	0	1.20	0	0.29	4.05	4.06
	Moderate		0.44		0.44	0.44	0.44
	Difficult		0		0	0	0
	Extremely Difficult		0.27		0	0	0
Nonhighway-legal Motorcycle	Easy	0	4.56	0	0.29	7.61	7.40
	Moderate		3.10		0.44	5.87	5.20
	Difficult		6.04		0	8.29	5.82
	Extremely Difficult		0.27		0	0	0
Nonhighway-legal ATV	Easy	0	4.35	0	0.29	7.40	7.40
	Moderate		3.10		0.44	5.82	5.15
	Difficult		2.48		0	4.73	2.27
	Extremely Difficult		0.27		0	0	0
Total Mileage in Alternative – Proposed Trail Route Additions		**0**	**14**	**0**	**0.73**	**21.77**	**18.42**

Note: This table summarizes Proposed Trail Route Additions only since no existing NFTS trails are designated for motorized use.

Table 14. Open area acreage forestwide by alternative by vehicle class

Vehicle Class	Season of Use	Acreage Proposed to be Added to NFTS					
		1	2	3	4	5	6
Total Open to Nonhighway-legal Use and Highway-legal vehicles 50" or less in width	Year-round	1,233,340	65	0	0	48	48
	May 1 – October 31	0	0	0	0	5	5
Total Open to Highway-legal Use	Year-round	1,233,340	0	0	0	0	0
Total Acreage in Alternative		1,233,340[a]	65	0	0	53	53

a - Open area acreage under alternative 1 is open to both highway-legal and nonhighway-legal use. Acreage figure includes areas on the KNF that are currently open to motorized use

Measurement Indicator 4:

Type of motorized access to dispersed recreation

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

Method:

Quality of Road/Dispersed Experience: Number of facilities provided as surrogate for number of dispersed sites accessed. The Klamath NF has separated out proposed road additions which provide access to dispersed recreation sites. These proposed roads were used for this indicator. One site per route addition for the purposes of access to dispersed recreation will be used as a proxy (in some instances multiple sites are accessed via a single route addition).

Quality of Trail Experience: Number of facilities provided as surrogate for number of dispersed sites accessed. One site per route addition for the purposes of access to dispersed recreation will be used as a proxy (in some instances multiple sites are accessed via a single route addition).

The Klamath NF has identified proposed road additions which provide access to dispersed camping sites in each alternative. In some instances multiples sites may be accessed by these proposed route additions. The number of dispersed recreation sites shown in the table below represents the minimum number of dispersed recreation sites potentially accessed in each alternative.

Table 15. Number of dispersed recreation sites accessed by routes proposed for addition to the NFTS under each alternative

	Number of Dispersed Sites Accessed					
	1	2	3	4	5	6
Unauthorized Road Additions	N/A[a]	258	0	25	206	164
Unauthorized Trail Additions	N/A[a]	22	0	2	33	30
Total Sites Accessed in Alternative	N/A[a]	280	0	27	239	194

a - Under alternative 1, access to dispersed recreation sites would continue. The number of sites accessed is difficult to determine. With continued cross-country motorized travel under alternative 1, access to dispersed recreation sites would be available on lands open to cross-country motorized travel. See Table 14 for open area acreage available under alternative 1.

Measurement Indicator 5:

Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

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

Method: Number of miles of new routes proposed within ½ miles of populated areas, neighboring federal land boundaries, wilderness boundaries, and private land boundaries (acts as a surrogate to indicate how much conflict off NFTS may occur by alternative). This method was determined through a literature review of sound studies and reports listed in the references section of chapter 4.

Table 16. Number of miles of routes proposed for addition to the NFTS under each alternative within ½ mile of neighboring private and federal lands

	Mileage Proposed to be Added to NFTS					
	1	2	3	4	5	6
Route Additions	0	53.31	0	2.57	36.03	32.65
Total Mileage in Alternative – including NFTS	2,031[a]	1,851.31	1,801	1,800.57	1,835.03	1,830.65
Percent Change	0%	3%	0%	0%	2%	2%

a - For alternative 1, Total Mileage in alternative includes the existing NFTS and the inventoried unauthorized OHV routes within ½ mile of neighboring private and federal lands and wilderness.

3.7.4 Affected Environment/Environmental Consequences

Affected Environment

The Klamath National Forest's 1.7 million acre expanse of winding river canyons, rugged lake-speckled wilderness areas, and distinctive volcanic landscapes provide a setting for a variety of recreational activities. Remoteness from large population centers provides opportunities for uncrowded recreational experiences. The Forest's recreation program niche, "room to renew," emphasizes this value. The Klamath's rich traditional and contemporary cultures of Native Americans, western settlers, ranchers, loggers and miners further enrich the experiences of today's visitors.

The Forest receives approximately 535,577 recreational visits per year, with the most popular recreational activities being relaxing, viewing natural features, driving for pleasure, hiking, cross-country skiing, and viewing wildlife. Other popular activities include fishing, hunting, whitewater pursuits, swimming, camping, bicycling, snowmobiling, gathering forest products and other automobile travel. Most visitors come from nearby communities with over 50 percent from Siskiyou County, CA, or Jackson County, OR (USDA Forest Service, 2001).

Recreational Experiences

The Forest offers a diverse range of motorized and non-motorized recreational experiences throughout the year. Motorized recreation involves the use of highway-licensed cars, sedans, sport utility vehicles (SUVs), dual-sport motorcycles, off-highway vehicles (OHVs), motorcycles, all-terrain vehicles (ATVs), snowmobiles and four-wheel-drive-vehicles (4WDs). Non-motorized recreational activities include hiking, camping, bicycling, horseback riding, wildlife viewing, whitewater pursuits, swimming,

picnicking, hunting, fishing, cross-country skiing, snowshoeing, and backpacking (USDA Forest Service, 2001).

The Klamath NF consists of about 1.7 million acres available for public use. Of this total, about 455,300 acres, or about 38 percent of the Forest, is closed to OHV use by management area standards and guidelines in the LRMP. Those management areas closed to OHV use include: research natural areas, designated wilderness areas, designated and recommended wild rivers, and backcountry areas. Available lands outside of the management areas listed above results in about 1,233,340 acres of land open for cross-country motorized travel. Currently the Humbug area on the Oak Knoll Ranger District and the Juniper Flat area on the Goosenest Ranger District receive the highest concentrated cross-country travel OHV use on the forest.

The Forest offers 51 developed recreation sites, which include 4 picnic sites, 2 snow parks, 5 river accesses, 12 trailheads and 28 campgrounds. Many of these sites include accessible facilities. Generally the developed sites are uncrowded with average occupancy at 33 percent.

Dispersed recreation is outdoor recreation occurring over broad expanses of land or water and accounts for the majority of Forest recreation use which occurs primarily during the fall and summer months. Approximately 322 inventoried dispersed camping sites, which require some level of active management, are on the Forest. Dispersed recreation opportunities, especially dispersed camping opportunities, are highly valued by Forest visitors. Some dispersed sites have been used by the same families for several generations. Additionally, some dispersed recreation sites have a uniquely identifiable sense of place with vistas and scenery viewing opportunities. In some cases structures and facilities are provided in these areas primarily to protect resources, rather than to provide convenience.

Wild and Scenic Rivers

Recreation use associated with the Klamath River is a large portion of the total dispersed use on the Forest. Wild and scenic rivers on the west side of the Forest are a recreational attraction providing opportunities along approximately 200 miles of river. The Klamath, Scott and Salmon Rivers, as well as several of their larger tributaries, provide outstanding whitewater boating opportunities. The season of boating use for the Scott and Salmon Rivers is from early spring to the end of June, or when water levels are high enough to make them navigable. The Klamath River, in contrast, is dam-regulated above the Forest boundary. It is usable throughout the year. Most floating on the Klamath River occurs between Memorial Day and Labor Day.

Wilderness

Over 381,100 acres, about 23 percent of the Forest's land base, is in wilderness. This includes all of the Marble Mountain Wilderness (223,500 acres), all of the Russian Wilderness (12,700 acres), nearly half of the Siskiyou Wilderness (70,100 acres), part of the Trinity Alps Wilderness (74,900 acres) and a five acre

portion of the Red Buttes Wilderness. The 2001 National Visitor Use Monitoring results estimate wilderness use to be approximately 24,000 visits per year with a 50.6 hour average length of stay.

Trails

The Forest trail system provides access for dispersed recreational activities. The west side of the Forest has an extensive network of over 935 miles of non-motorized trails. Approximately 60 percent of these trail miles are located within designated wilderness. There are over 160 miles of nationally recognized trail including the Pacific Crest National Scenic Trail (115 miles), Clear Creek National Recreation Trail, Kelsey National Recreation Trail and Boundary National Recreation Trail. All trails on the Forest trail system are designated for non-motorized use. No trails on the existing trail system are designated for off-highway vehicle motorized use.

On the east side of the Forest there is a system of roads seasonally managed as snowmobile trails through the State of California OHV Grants Program. This trail system is the only snowmobile trail system on the Forest and provides approximately 140 miles of groomed snowmobiling trails.

Travelways

One All American road, three National Forest Scenic Byways, four highways, and many rural/backcountry road corridors traverse the Forest, showcasing a rich diversity of geology, climate, plants, wildlife and rural communities. The steep walled Klamath, Salmon and Scott wild and scenic river (WSR) canyons provide scenic and recreational values with vehicle access. Goosenest RD and Butte Valley Grasslands travelways provide access to gentle volcanic landscapes that offer panoramic views of volcanoes, mixed conifer and true fir forests, lakes, high elevation meadows, aspen groves, wetlands and rich wildlife.

Table 17. Klamath NF visitor activity participation and primary activity as reported in NVUM results (2001).

Activity	Percent Participating	Percent as Main Activity
Viewing Natural Features	61.4	15.3
Relaxing	38.0	9.7
Hiking / Walking	20.3	3.3
Downhill Skiing	1.4	1.0
Viewing Wildlife	43.9	1.0
Horseback Riding	0.4	0.3
Driving for Pleasure	26.6	8.1
Other Non-motorized	6.9	2.2
Other Motorized	0.0	0.0
Fishing	7.1	3.7
Developed Camping	4.1	2.1
OHV Use	8.5	1.1
Primitive Camping	4.0	1.1

Activity	Percent Participating	Percent as Main Activity
Nature Study	14.4	0.9
Hunting	3.1	2.9
Gathering Forest Products	8.4	6.8
Nature Center Activities	2.0	0.3
Non-motorized Water	2.1	1.2
Motorized Water Activities	0.3	0.0
Picnicking	8.3	3.9
Cross-country Skiing	18.5	18.3
Snowmobiling	0.6	0.6
Bicycling	0.8	0.3
Visiting Historic Sites	1.1	0.0
Backpacking	3.9	2.2
Resort Use	0.3	0.0

Based on the NVUM, there were 535,577 visits to National Forest System Lands on the Klamath NF during fiscal year 2001. This would mean that 142,463 visitors spent some time driving for pleasure, 45,524 used off-highway vehicles during their visit, and the primary activity for 5,891 visitors was off-highway vehicle use. Based on the 2001 year visits, when primary motorized uses are combined (including OHV use, driving for pleasure and other motorized activities), approximate visitor numbers equal 49,273. When primary non-motorized uses are combined, (including backpacking, fishing, hiking/walking, horseback riding, bicycling and other non-motorized activities), approximate visitor numbers equal 64,269 (Table 18). Motorized access is the primary form of access to non-motorized recreation activities on the forest.

Table 18. Approximate Klamath NF visitors by type of main activity

Type of Use	NVUM Categories	Percent as Main Activity	Approximate Visitors in 2001
Camping	Developed Camping Primitive Camping	3.2	17,138
Hunting	Hunting	2.9	15,532
Motorized Uses	OHV use Driving for Pleasure Other Motorized Activity	9.2	49,273
Non-motorized Uses	Backpacking Fishing Hiking/Walking Horseback Riding Bicycling Other Non-Motorized Activities	12.0	64,269

Type of Use	NVUM Categories	Percent as Main Activity	Approximate Visitors in 2001
Other Activities	Resort Use Picnicking Viewing Natural Features Visiting Historic Sites Nature Center Activities Nature Study Relaxing Gathering Forest Products Viewing Wildlife	37.9	202,984
Water Sports	Motorized Water Activities; Non-motorized Water	1.2	6,427
Winter Sports	Downhill Skiing; Cross-country Skiing; Snowmobiling	19.9	106,580

Environmental Consequences

This section discloses the environmental effects of each of the alternatives on recreation on the Forest. This analysis is focused on the effects of three management actions: (1) the prohibition of cross-country motorized travel, (2) additions of currently unauthorized routes to the national forest transportation system (NFTS), and (3) changes to the existing NFTS. Nearly all forest visitors, regardless of the purpose for their visit, use the motorized transportation system to reach their destination. Changes to traditionally accepted forest practices, such as cross-country motorized travel, alters the diversity of motorized and non-motorized opportunities on the Forest. Visitors seeking a quiet, non-motorized experience often utilize motorized vehicles to access trailheads, facilities, destinations, or geographic areas for non-motorized recreational activities.

Considerations for all alternatives:

Short-term timeframe: 1 year

Long-term timeframe: 20 years.

Spatial boundary: The Forest boundary is the unit of spatial analysis when considering effects associated with changes in the NFTS or season of use.

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.

Alternative 1 – No Action

Under the no action alternative, the existing condition as described in the affected environment section would continue. The Travel Management Rule would not be implemented, and a motor vehicle use map

would not be produced. Unauthorized routes would continue to proliferate and have no status or authorization as NFTS facilities.

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel.

Under this alternative, cross-country motorized vehicle travel would be allowed over most of the Forest. Most of this travel occurs on open terrain or on non-system routes which may appear to be rough roads due to use over time. It is anticipated that cross-country motorized travel would continue, and probably increase in areas with gentle terrain such as the Humbug area on the Oak Knoll Ranger District, and on the Goosenest Ranger District. Although consistent with LRMP guidance for ROS, cross-country motorized travel may affect ROS class settings in the short and long term. Motorized use could inadvertently spread to non-motorized areas, changing areas with non-motorized ROS class settings, such as semi-primitive non-motorized, to ROS classes with motorized settings such as semi-primitive motorized, roaded natural, or rural.

The short-term and long-term effects of cross-country motorized travel include the increased potential for conflicts with users seeking a “quiet” recreation experience, as well as increasing dust and noise on neighboring private and federal lands. Under this alternative about 13.3 percent of the Forest would be affected by the dust, odors, and noise typically associated with the motorized use of the inventoried unauthorized routes and cross-country motorized travel. In the long term, visitors seeking a “quiet” recreation experience would likely be displaced to areas on the western side of the Forest, including wilderness and unroaded areas, where steep topography naturally restricts cross-country motorized travel. For the impacts on motorized use on inventoried roadless areas, see the inventoried roadless areas and roadless characteristics section of the document.

Dispersed recreation is outdoor recreation occurring over broad expanses of land or water and accounts for the majority of Forest recreation use. Access to dispersed recreation sites occurs on both the existing NFTS and unauthorized motorized routes. In both the short and long term, no change in motorized access to dispersed recreation activities would occur.

Under the no action alternative, motorized recreation opportunities on about 408 miles of unauthorized routes would continue, and about 1,233,340 acres would continue to have unrestricted cross-country motorized travel. The open area acreage and unauthorized motorized routes would not experience any changes or use restrictions. No net change in motorized recreation opportunities would occur, and as a result there would be no short or long term direct or indirect effects to motorized recreation opportunities.

Indicators referenced:

- Measurement Indicator 1: ROS consistency with LRMP
- Measurement Indicator 2: Non-motorized recreation opportunity

- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 4: Type of motorized access to dispersed recreation
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

2. Direct/Indirect Effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

No additions to the existing NFTS would be made under this alternative. No direct or indirect effects would result, as no change would be made from the current management situation.

Indicators referenced:

- Measurement Indicator 3: Motorized recreation opportunity

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

No changes to the NFTS in regards to restricting season of use, vehicle class, or class of roads and trails would be made under this alternative. No direct or indirect effects would result, as no change would be made from the current management situation.

Indicators referenced:

- Measurement Indicator 3: Motorized recreation opportunity

Alternative 2 – Proposed Action

This alternative is the proposed action including the proposed changes to the NFTS and the prohibition of cross-country travel as described in the NOI published in the Federal Register on October 7, 2008. This alternative adds about 14 miles (22 segments) of motorized trails to the NFTS, adds 24 miles (258 segments) of roads to access dispersed camping sites, adds 54 miles of roads to the NFTS, adds 65 acres (two areas) open to cross-country motorized travel, allows 119 miles of mixed use, prohibits 10 miles of mixed use, opens 9.96 miles of NFTS roads currently closed to public use, prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel.

Under this alternative, cross-country motorized vehicle travel would be prohibited. The prohibition of wheeled motor vehicle use off the NFTS and proposed open areas would have a beneficial effect on non-motorized recreation activities throughout the Forest, in populated areas, and neighboring federal lands in the short and long terms by reducing noise, dust and physical presence of motorized vehicles. Prohibiting cross-country motorized travel would also curtail on-going negative effects from motorized vehicles such as noise, dust and physical presence in the short and long terms.

Prohibiting cross-country motorized vehicle travel in alternative 2 would result in a net loss of acreage available for motorized recreation. Although motorized recreation would be reduced, this alternative proposes two areas, totaling 65 acres, for cross-country motorized travel in the Humbug area (season of use May 1 – October 31) and Juniper Flat area (open year round). The season of use restrictions in the Humbug area may have a negative effect in the short and long terms to motorized opportunities by reducing area available for motorized opportunity during the closure and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure. This loss of available open acreage is somewhat offset, however, by the proposed addition of motorized routes to the NFTS and by changes in use type on some existing routes. Although motorized recreation opportunities on open acreage would be greatly reduced, other motorized recreation opportunities would be available and the NFTS would be increased.

Indicators referenced:

- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

2. Direct/Indirect Effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Adding presently unauthorized roads and trails would be consistent with ROS as allocated in the LRMP. All routes proposed for addition to the NFTS comply with the ROS class in the associated management area. All proposed route additions under this alternative would be located in semi-primitive motorized, roaded natural, or rural ROS classes.

Adding presently unauthorized roads and trails may have a negative effect in both short and long term context for non-motorized opportunities due to an increase in noise, dust, physical presence, possible use conflicts and displacement. Under this alternative about 6.6 percent of the Forest would be affected by the dust, odors, and noise typically associated with the proposed route and area additions. When compared to the other action alternatives, the proposed route additions under this alternative would have the most impact on the Forest's "quiet" recreation opportunities (see Table 9). Alternative 2 proposes 53.31 miles of road and trail route additions within ½ mile of neighboring private and federal lands and wilderness areas, potentially having the greatest noise, dust, and physical presence impacts on neighboring private and federal lands and wilderness areas when compared to the other action alternatives (see Table 16). The season of use restrictions on proposed trail additions and some road additions may have a negative effect in the short and long terms to motorized opportunities and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure.

Motorized roads, trails, and areas would be administratively defined and published on a motor vehicle use map (MVUM). Recreationists would be able to better plan recreational pursuits based on an individual's unique expectations. As a result, the frequency of user conflicts between non-motorized and motorized recreation users would likely decrease in the short and long terms.

Adding presently unauthorized roads and trails would have a beneficial effect on motorized opportunities. The proposed trail additions in alternative 2 contribute to a variety of experiences with easy-to-extremely difficult riding experiences for all trail class vehicles as shown in Table 13. The proposed route additions also contribute to the continuity of the motor-touring opportunities by reducing dead-end routes, increasing loop and connector opportunities, and providing access to a diversity of dispersed recreation activities, providing beneficial effects to motorized recreation opportunities. As shown in Table 15, alternative 2 provides motorized access to a total of 280 dispersed recreation sites, providing a beneficial effect to motorized recreation opportunities. Alternative 2 provides the most motorized access to dispersed recreation sites when compared to the other action alternatives.

Alternative 2 also provides the highest amount of road and trail additions to the NFTS (92 miles) and proposes opening 9.96 miles of closed NFTS roads, presenting a beneficial effect on motorized recreation opportunities for a diversity of vehicle classes and access to dispersed recreation. This alternative proposes year-round motorized opportunities on 80.67 miles of road for highway-legal motorcycles, 4WDs, and passenger cars and about 79.49 miles of road for nonhighway-legal 4WDs, ATVs, and motorcycles. An additional 7.29 miles of road would be open to all vehicle classes from May 1 to October 31. About 14 miles of routes would be proposed as motorized trails under this alternative with opportunities for all trail class vehicles. Dual sport highway-legal motorcycles and nonhighway-legal motorcycles would have the most opportunities on proposed trail additions in this alternative with all proposed trails open to these vehicle classes. About 10.20 miles of proposed trail would be for nonhighway-legal ATVs, while 1.91 miles of proposed trail would be for highway-legal high-clearance 4WDs and nonhighway-legal 4WDs. All proposed trails under this alternative have a season of use from May 1 to October 31. The season of use restrictions on proposed trail additions and some road additions may have a negative effect in the short and long terms to motorized opportunities by reducing mileage of motorized opportunity during the closure and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure.

Indicators referenced:

- Measurement Indicator 1: ROS consistency with LRMP
- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 4: Type of motorized access to dispersed recreation

- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

Changes to the NFTS that add vehicle classes to the NFTS by providing more mixed use would benefit motorized recreation by increasing the diversity of motorized opportunities while changes in class that restrict motor vehicle on the NFTS would negatively affect motorized recreation diversity. No season of use restrictions are proposed to the existing NFTS under this alternative.

Alternative 2 proposes mixed use on about 119 miles of NFTS roads. This mileage would be available for all vehicle classes listed in Table 10. Mixed use on NFTS roads would benefit motorized recreation by increasing the diversity of motorized opportunities. Alternative 2 proposes prohibiting mixed use on about 10 miles of NFTS roads. This mileage would only be available for highway-legal vehicle classes. The prohibition of mixed use which restricts nonhighway-legal motor vehicles on the NFTS would negatively affect motorized recreation diversity. However, the prohibition of mixed use on the NFTS would protect adjacent private lands from intrusion by and impacts from OHVs, a benefit to the affected landowners who have experienced high levels of trespass from unrestricted OHV use.

Indicators referenced:

- Measurement Indicator 3: Motorized recreation opportunity

Alternative 3 – Prohibit Cross-country Travel No Change to Existing NFTS

Alternative 3 prohibits cross-country motorized travel and proposes no new additions or changes to the existing NFTS of roads and trails.

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel.

This alternative would prohibit cross-country motorized travel with motorized recreation restricted to existing NFTS roads. The prohibition of wheeled motor vehicle use off the NFTS would have a beneficial effect on non-motorized recreation activities throughout the Forest, in populated areas, and neighboring federal lands in the short and long terms by reducing dust and noise from motorized vehicles. Prohibiting cross-country motorized travel would also curtail on-going negative effects from motorized vehicles such as noise, dust, and physical presence in the short and long terms. When compared to the other action alternatives, this alternative provides the most “quiet” recreation opportunities (see Table 9) and provides the least impact to neighboring private and federals lands and wilderness areas in the short and long terms (see Table 16).

Prohibiting cross-country motorized vehicle travel in alternative 3 would result in a loss of acreage available for motorized recreation. Alternative 3 represents the current condition except for prohibiting cross-country motorized travel. Motorized use would no longer occur on unauthorized routes and all

currently unauthorized routes would naturally rehabilitate. This alternative has fewer miles of motorized opportunity than the current condition and provides the least amount of motorized recreation opportunities when compared to the other action alternatives (see Table 10, Table 11, Table 12, and Table 13).

Alternative 3 provides the least amount of access to dispersed recreation sites. Some dispersed sites have been used by the same families for several generations. Forest visitors may find that their favorite dispersed site is no longer accessible by a motorized vehicle. Additionally, some dispersed sites with vistas and scenery viewing opportunities may no longer be easily accessible. As shown in Table 15, Alternative 3 provides motorized access to zero additional dispersed recreation sites.

Indicators referenced:

- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 4: Type of motorized access to dispersed recreation
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

2. Direct/Indirect Effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

No additions to the existing NFTS would be made under this alternative. No direct or indirect effects would result, as no change would be made from the current management situation.

Indicators referenced:

- Measurement Indicator 3: Motorized recreation opportunity

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

No changes to the NFTS in regards to restricting season of use, vehicle class, or class of roads and trails would be made under this alternative. No direct or indirect effects would result, as no change would be made from the current management situation.

Indicators referenced:

- Measurement Indicator 3: Motorized recreation opportunity

Alternative 4 – Add Fewer Routes

Alternative 4 prohibits cross-country motorized travel and adds fewer routes to the NFTS in response to the concerns of cost, maintenance, wilderness, quiet recreation use, and natural resource impacts. This

alternative adds about 0.73 miles (2 segments) of motorized trails to the NFTS, adds 1.71 miles (25 segments) of roads to the NFTS to access dispersed camping sites, adds 4.45 miles of roads to the NFTS, adds no areas open to cross-country travel, allows 119.25 miles of mixed use, prohibits 7.66 miles of mixed use, and prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel.

Under this alternative, cross-country motorized vehicle travel would be prohibited. The prohibition of wheeled motor vehicle use off the NFTS and proposed open areas would have a beneficial effect on non-motorized recreation activities throughout the Forest, in populated areas, and neighboring federal lands in the short and long terms by reducing dust and noise from motorized vehicles. Prohibiting cross-country motorized travel would also curtail on-going negative effects from motorized vehicles such as noise, dust and physical presence in the short and long terms.

Prohibiting cross-country motorized vehicle travel in alternative 4 would result in a net loss of acreage available for motorized recreation. Alternative 4 provides no opportunities for cross-country motorized travel, resulting in a negative impact on motorized recreation opportunities. The loss of available open acreage is somewhat offset, however, by the proposed addition of motorized routes to the NFTS and by changes in use type on some existing routes. Although motorized recreation opportunities on open acreage would be greatly reduced, other motorized recreation opportunities would be available and the NFTS would be increased.

Indicators referenced:

- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

2. Direct/Indirect Effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Adding presently unauthorized roads and trails would be consistent with ROS as allocated in the LRMP. All routes proposed for addition to the NFTS comply with the ROS class in the associated management area. All proposed route additions under this alternative would be located in semi-primitive motorized, roaded natural, or rural ROS classes.

Adding presently unauthorized roads and trails may have a negative effect in both short and long term context for non-motorized opportunities due to an increase in noise, dust, physical presence, possible use conflicts and displacement. Under this alternative about 0.7 percent of the Forest would be affected by the dust, odors, and noise typically associated with the proposed route additions. When compared to the other

action alternatives, the proposed route additions under alternative 4 would have less impact on the Forest's "quiet" recreation opportunities than alternatives 2, 5, and 6 and slightly more impact on the Forest's "quiet" recreation opportunities than alternative 3 (see Table 9). Alternative 4 proposes 2.57 miles of road and trail route additions within ½ mile of neighboring private and federal lands, potentially having some noise, dust, and physical presence impacts on neighboring private and federal lands. When compared to the other action alternatives, alternative 4 would have less impact on neighboring private and federal lands than alternatives 2, 5, and 6 and slightly more impact than alternative 3 (see Table 16). The season of use restrictions on proposed trail additions may have a negative effect in the short and long terms to motorized opportunities by reducing mileage of motorized opportunity during the closure and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure. All road additions under alternative 4 would have no season of use restrictions.

Motorized roads, trails, and areas would be administratively defined and published on a motor vehicle use map (MVUM). Recreationists would be able to better plan recreational pursuits based on an individual's unique expectations. As a result, the frequency of user conflicts between non-motorized and motorized recreation users would likely decrease in the short and long terms.

Adding presently unauthorized roads and trails would have a beneficial effect on motorized opportunities. The proposed trail additions in alternative 4 provide easy and moderate riding experiences for all trail class vehicles as shown in Table 13. The proposed route additions contribute to the continuity of the motor-touring opportunities by reducing dead-end routes, increasing connector opportunities, and providing access to dispersed recreation activities, providing beneficial effects to motorized recreation opportunities. As shown in Table 15, alternative 4 provides motorized access to a total of 27 dispersed recreation sites. Some dispersed sites with vistas and scenery viewing opportunities may no longer be easily accessible. When compared to the other action alternatives, alternative 4 provides less motorized access to dispersed recreation than alternatives 2, 5, and 6, but more motorized access than alternative 3.

Alternative 4 also provides 6.89 miles of road and trail additions to the NFTS, presenting a beneficial effect on motorized recreation opportunities for a variety of vehicle classes and access to dispersed recreation. This alternative proposes year-round motorized opportunities on 6.16 miles of road for highway-legal motorcycles, 4WDs, and passenger cars and nonhighway-legal 4WDs, ATVs, and motorcycles. About 0.73 miles of routes would be proposed as motorized trails under this alternative with opportunities for all trail class vehicles including: dual sport highway-legal motorcycles, nonhighway-legal motorcycles, nonhighway-legal ATVs, highway-legal high-clearance 4WDs and nonhighway-legal 4WDs. All proposed trails under this alternative have a season of use from May 1 to October 31. The season of use restrictions on proposed trail additions may have a negative effect in the short and long terms to motorized opportunities by reducing mileage of motorized opportunity during the closure and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized

activities during the closure. All road additions under alternative 4 would have no season of use restrictions.

Indicators referenced:

- Measurement Indicator 1: ROS consistency with LRMP
- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 4: Type of motorized access to dispersed recreation
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

Changes to the NFTS that add vehicle classes to the NFTS by providing more mixed use would benefit motorized recreation by increasing the diversity of motorized opportunities while changes in class that restrict motor vehicle on the NFTS would negatively effect motorized recreation diversity. No season of use restrictions are proposed to the existing NFTS under this alternative.

Alternative 4 proposes mixed use on about 119.25 miles of NFTS roads. This mileage would be available for all vehicle classes listed in Table 10. Mixed use on NFTS roads would benefit motorized recreation by increasing the diversity of motorized opportunities. Alternative 4 proposes prohibiting mixed use on about 7.66 miles of NFTS roads. This mileage would only be available for highway-legal vehicle classes. The prohibition of mixed use which restricts nonhighway-legal motor vehicles on the NFTS would negatively affect motorized recreation diversity. However, the prohibition of mixed use on the NFTS would protect adjacent private lands from intrusion by and impacts from OHVs, a benefit to the affected landowners who have experienced high levels of trespass from unrestricted OHV use. Although alternative 4 provides less motorized recreation opportunity through proposed route additions when compared to alternatives 2, 5, and 6, it provides more motorized recreation opportunity on existing NFTS roads through mixed use when compared to alternatives 2 and 6.

Indicators referenced:

- Measurement Indicator 3: Motorized recreation opportunity

Alternative 5 – Add More Routes

This alternative is based on corrections to the proposed action (alternative 6) and proposes additional routes and mixed use to provide for more access and motorized recreation opportunity. This alternative adds about 21.77 miles (33 segments) of motorized trails to the NFTS, adds 30.56 miles (206 segments)

of roads to the NFTS to access dispersed camping sites, adds 16.69 miles of roads to the NFTS, adds 53 acres (2 areas) open to cross-country travel, allows 277.77 miles of mixed use, prohibits 7.66 miles of mixed use, opens 4.66 miles of NFTS roads currently closed to public use, and prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel.

Under this alternative, cross-country motorized vehicle travel would be prohibited. The prohibition of wheeled motor vehicle use off the NFTS and proposed open areas would have a beneficial effect on non-motorized recreation activities throughout the Forest, in populated areas, and neighboring federal lands in the short and long terms by reducing dust and noise from motorized vehicles. Prohibiting cross-country motorized travel would also curtail on-going negative effects from motorized vehicles such as noise, dust and physical presence in the short and long terms.

Prohibiting cross-country motorized vehicle travel in alternative 5 would result in a net loss of acreage available for motorized recreation. Although motorized recreation would be reduced, this alternative proposes two areas, totaling 53 acres, for cross-country motorized travel. The Humbug area would be about 5 acres in size with a season of use of May 1 to October 31. The Juniper Flat area would be about 48 acres in size and open year round. The season of use restrictions in the Humbug area may have a negative effect in the short and long terms to motorized opportunities by reducing area available for motorized opportunity during the closure and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure. Area perimeters would be defined with signs, barricades or fencing. A parking area would be established and a kiosk installed posting rules, regulations, Tread Lightly information, and area map. The loss of available open acreage is somewhat offset, however, by the proposed addition of motorized routes to the NFTS and by changes in use type on existing routes. Although motorized recreation opportunities on open acreage would be greatly reduced, other motorized recreation opportunities would be available and the NFTS would be increased.

Indicators referenced:

- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

2. Direct/Indirect Effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Adding presently unauthorized roads and trails would be consistent with ROS as allocated in the LRMP. All routes proposed for addition to the NFTS comply with the ROS class in the associated management

area. All proposed route additions under this alternative would be located in semi-primitive motorized, roaded natural, or rural ROS classes.

Adding presently unauthorized roads and trails may have a negative effect in both short and long term context for non-motorized opportunities due to an increase in noise, dust, physical presence, possible use conflicts and displacement. Under this alternative about 6.2 percent of the Forest would be affected by the dust, odors, and noise typically associated with the proposed route and area additions. When compared to the other action alternatives, the proposed route additions under alternative 5 would have slightly less impact on the Forest's "quiet" recreation opportunities than alternative 2 and slightly more impact on the Forest's "quiet" recreation opportunities than alternatives 3, 4, and 6 (see Table 9). Alternative 5 proposes 36.03 miles of road and trail route additions within ½ mile of neighboring private and federal lands and wilderness areas, potentially having noise, dust, and physical presence impacts on those lands. When compared to the other action alternatives, alternative 5 has more impacts on neighboring private and federal lands and wilderness areas than alternatives 3, 4, and 6 and lesser impacts than alternative 2 (see Table 16). The season of use restrictions on proposed trail additions and some road additions may have a negative effect in the short and long terms to motorized opportunities and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure.

Motorized roads, trails, and areas would be administratively defined and published on a motor vehicle use map (MVUM). Recreationists would be able to better plan recreational pursuits based on an individual's unique expectations. As a result, the frequency of user conflicts between non-motorized and motorized recreation users would likely decrease in the short and long terms.

Adding presently unauthorized roads and trails would have a beneficial effect on motorized opportunities. The proposed trail additions in alternative 5 contribute to a variety of experiences with easy-to-difficult riding experiences for all trail class vehicles as shown in Table 13. The proposed route additions also contribute to the continuity of the motor-touring opportunities by reducing dead-end routes, increasing loop and connector opportunities, and providing access to a diversity of dispersed recreation activities, providing beneficial effects to motorized recreation opportunities. As shown in Table 15, alternative 5 provides motorized access to 239 dispersed recreation sites more than alternatives 3, 4, and 6 and less than alternative 2. Some dispersed sites with vistas and scenery viewing opportunities may no longer be easily accessible.

Alternative 5 proposes road and trail additions to the NFTS (69.02 miles) and proposes opening 4.66 miles of closed NFTS roads, presenting a beneficial effect on motorized recreation opportunities for a diversity of vehicle classes and access to dispersed recreation. This alternative proposes year-round motorized opportunities on 51.23 miles of road for highway-legal motorcycles, 4WDs, and passenger cars and about 50.45 miles of road for nonhighway-legal 4WDs, ATVs, and motorcycles. An additional 0.68 miles of road would be open to all vehicle classes from May 1 to October 31. About 21.77 miles of routes

would be proposed as motorized trails under this alternative with opportunities for all trail class vehicles. Alternative 5 proposes more route additions as motorized trails than the other action alternatives, providing a beneficial impact on motorized trail experiences. Dual sport highway-legal motorcycles and nonhighway-legal motorcycles would have the most opportunities on proposed trails in this alternative with all proposed trail additions open to these vehicle classes. About 17.95 miles of proposed trail would be for nonhighway-legal ATVs, while 4.49 miles of proposed trail would be for highway-legal high-clearance 4WDs and nonhighway-legal 4WDs. All proposed trails under this alternative have a season of use from May 1 to October 31. The season of use restrictions on proposed trail additions and some road additions may have a negative effect in the short and long terms to motorized opportunities by reducing mileage of motorized opportunity during the closure and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure.

Indicators referenced:

- Measurement Indicator 1: ROS consistency with LRMP
- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 4: Type of motorized access to dispersed recreation
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

Changes to the NFTS that add vehicle classes to the NFTS by providing more mixed use would benefit motorized recreation by increasing the diversity of motorized opportunities while changes in vehicle class that restrict mixed use on the NFTS would negatively affect motorized recreation diversity. No season of use restrictions are proposed to the existing NFTS under this alternative.

Alternative 5 proposes mixed use on about 277.77 miles of NFTS roads. This mileage would be available for all vehicle classes listed in Table 10. Mixed use on NFTS roads would benefit motorized recreation by increasing the diversity of motorized opportunities. Alternative 5 proposes prohibiting mixed use on about 7.66 miles of NFTS roads. This mileage would only be available for highway-legal vehicle classes. The prohibition of mixed use which restricts nonhighway-legal motor vehicles on the NFTS would negatively affect motorized recreation diversity. However, the prohibition of mixed use on the NFTS would protect adjacent private lands from intrusion by and impacts from OHVs, a benefit to the affected landowners who have experienced high levels of trespass from unrestricted OHV use. Although alternative 5 provides less motorized recreation opportunity through proposed route additions when compared to alternative 2, it provides more motorized recreation on existing NFTS roads through mixed

use when compared to all the action alternatives. Overall, alternative 5 is the most beneficial for motorized recreation opportunities.

Indicators referenced:

- Measurement Indicator 3: Motorized recreation opportunity

Alternative 6 – Refined Proposed Action

This alternative is based on corrections to the proposed action. Further field reconnaissance and analysis of the existing data led to refinement of the proposed action. This alternative adds about 18.42 miles (30 segments) of motorized trails to the NFTS, adds 26.3 miles (164 segments) of roads to the NFTS to access dispersed camping sites, adds 14.58 miles of roads to the NFTS, adds 53 acres (2 areas) open to cross-country travel, allows 105.21 miles of mixed use, prohibits 7.66 miles of mixed use, opens 4.66 miles of NFTS roads currently closed to public use, and prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel.

Under this alternative, cross-country motorized vehicle travel would be prohibited. The prohibition of wheeled motor vehicle use off the NFTS and proposed open areas would have a beneficial effect on non-motorized recreation activities throughout the Forest, in populated areas, and neighboring federal lands in the short and long terms by reducing dust and noise from motorized vehicles. Prohibiting cross-country motorized travel would also curtail on-going negative effects from motorized vehicles such as noise, dust and physical presence in the short and long terms.

Prohibiting cross-country motorized vehicle travel in alternative 6 would result in a net loss of acreage available for motorized recreation. Although motorized recreation would be reduced, this alternative proposes two areas, totaling 53 acres, for cross-country motorized travel. The Humbug area would be about 5 acres in size with a season of use of May 1 to October 31. The Juniper Flat area would be about 48 acres in size and open year round. The season of use restrictions in the Humbug area may have a negative effect in the short and long terms to motorized opportunities by reducing area available for motorized opportunity during the closure and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure. Area perimeters would be defined with either signs or fencing. A parking area would be established and a kiosk installed posting rules, regulations, Tread Lightly information, and area map. The loss of available open acreage is somewhat offset, however, by the proposed addition of motorized routes to the NFTS and by changes in use type on existing routes. Although motorized recreation opportunities on open acreage would be greatly reduced, other motorized recreation opportunities would be available and the NFTS would be increased.

Indicators referenced:

- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

2. Direct/Indirect Effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Adding presently unauthorized roads and trails would be consistent with ROS as allocated in the LRMP. All routes proposed for addition to the NFTS comply with the ROS class in the associated management area. All proposed route additions under this alternative would be located in semi-primitive motorized, roaded natural, or rural ROS classes.

Adding presently unauthorized roads and trails may have a negative effect in both short and long term context for non-motorized opportunities due to an increase in noise, dust, physical presence, possible use conflicts and displacement. Under this alternative about 5.6 percent of the Forest would be affected by the dust, odors, and noise typically associated with the proposed route and area additions. When compared to the other action alternatives, the proposed route additions under alternative 6 would have less impact on the Forest's "quiet" recreation opportunities than alternatives 2 and 5 and slightly more impact on the Forest's "quiet" recreation opportunities than alternatives 3 and 4 (see Table 9). Alternative 6 proposes 32.65 miles of road and trail route additions within ½ mile of neighboring private and federal lands and wilderness areas, potentially having noise, dust, and physical presence impacts on neighboring private and federal lands and wilderness areas. When compared to the other action alternatives, alternative 6 has more impacts on neighboring private and federal lands and wilderness areas than alternatives 3 and 4 and lesser impacts than alternatives 2 and 5 (see Table 16). The season of use restrictions on proposed trail additions and some road additions may have a negative effect in the short and long terms to motorized opportunities and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure.

Motorized roads, trails, and areas would be administratively defined and published on a motor vehicle use map (MVUM). Recreationists would be able to better plan recreational pursuits based on an individual's unique expectations. As a result, the frequency of user conflicts between non-motorized and motorized recreation users would likely decrease in the short and long terms.

Adding presently unauthorized roads and trails would have a beneficial effect on motorized opportunities. The proposed trail additions in alternative 6 contribute to a variety of experiences with easy-to-difficult riding experiences for all trail class vehicles as shown in Table 13. The proposed route additions also contribute to the continuity of the motor-touring opportunities by reducing dead-end routes, increasing loop and connector opportunities, and providing access to a diversity of dispersed recreation

activities, providing beneficial effects to motorized recreation opportunities. As shown in Table 15, alternative 6 provides motorized access to 194 dispersed recreation sites; more than alternatives 3 and 4 and less than alternatives 2 and 5. Some dispersed sites with vistas and scenery viewing opportunities may no longer be easily accessible.

Alternative 6 proposes road and trail additions to the NFTS (59.3 miles) and proposes opening 4.66 miles of closed NFTS roads, presenting a beneficial effect on motorized recreation opportunities for a diversity of vehicle classes and access to dispersed recreation. This alternative proposes year-round motorized opportunities on 45.21 miles of road for highway-legal motorcycles, 4WDs, and passenger cars and about 44.43 miles of road for nonhighway-legal 4WDs, ATVs, and motorcycles. An additional 0.33 miles of road would be open to all vehicle classes from May 1 to October 31. About 18.42 miles of routes would be proposed as motorized trails under this alternative with opportunities for all trail class vehicles. Dual sport highway-legal motorcycles and nonhighway-legal motorcycles would have the most opportunities on proposed trails in this alternative with all proposed trail additions open to these vehicle classes. About 14.81 miles of proposed trail would be for nonhighway-legal ATVs, while 4.49 miles of proposed trail would be for highway-legal high-clearance 4WDs and nonhighway-legal 4WDs. All proposed trails under this alternative have a season of use from May 1 to October 31. The season of use restrictions on proposed trail additions and some road additions may have a negative effect in the short and long terms to motorized opportunities a by reducing mileage of motorized opportunity during the closure and a beneficial effect to non-motorized opportunities by increasing the acreage available for non-motorized activities during the closure.

Indicators referenced:

- Measurement Indicator 1: ROS consistency with LRMP
- Measurement Indicator 2: Non-motorized recreation opportunity
- Measurement Indicator 3: Motorized recreation opportunity
- Measurement Indicator 4: Type of motorized access to dispersed recreation
- Measurement Indicator 5: Impact of proposed changes to the NFTS on neighboring private and federal lands (dust, noise, use conflicts).

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

Changes to the NFTS that add vehicle classes to the NFTS by providing more mixed use would benefit motorized recreation by increasing the diversity of motorized opportunities while changes in class that restrict motor vehicle on the NFTS would negatively affect motorized recreation diversity. No season of use restrictions are proposed to the existing NFTS under this alternative.

Alternative 6 proposes mixed use on about 105.21 miles of NFTS roads. This mileage would be available for all vehicle classes listed in Table 10. Mixed use on NFTS roads would benefit motorized recreation by increasing the diversity of motorized opportunities. Alternative 6 proposes prohibiting mixed use on about 7.66 miles of NFTS roads. This mileage would only be available for highway-legal vehicle classes. The prohibition of mixed use which restricts nonhighway-legal motor vehicles on the NFTS would negatively affect motorized recreation diversity. However, the prohibition of mixed use on the NFTS would protect adjacent private lands from intrusion by and impacts from OHVs, a benefit to the affected landowners who have experienced high levels of trespass from unrestricted OHV use. Alternative 6 provides less motorized recreation opportunity through proposed route additions and proposed mixed use changes when compared to alternative 5, but it provides more motorized recreation on existing NFTS roads through mixed use when compared to alternatives 2 and 3. Alternative 6 would have beneficial impacts for motorized recreation opportunities, albeit less than alternative 5.

Indicators referenced:

- Measurement Indicator 3: Motorized recreation opportunity

Cumulative Effects

The cumulative effects analysis for recreation considers the impact of the alternatives when combined with past, present, and foreseeable future actions and events. The spatial boundary (forestwide) of the cumulative effects analysis was selected because impacts to the recreation system in one area of the Forest can affect the continuity of the system and public access opportunities in other parts of the Forest. The temporal scope is 20 years and was selected because impacts to recreation and public access from present and reasonably foreseeable future activities may occur over this timeframe. In analyzing cumulative effects of Motorized Travel Management, the Klamath National Forest considered effects from all present and reasonably foreseeable future actions that have potential for changing road density within the analysis area. The actions affecting the recreation resource include new road construction, reconstruction, decommissioning and/or adding roads to the Forest transportation system. These actions were selected because they have caused or have the potential to cause changes in recreation opportunities, public access, or the creation of routes on the ground. For a full list of the present and reasonably foreseeable future actions considered in this analysis, see Appendix B. The past activities, including the existing NFTS, have shaped the recreation opportunities and ROS settings available on the Forest. The effects of the present and reasonably foreseeable future activities listed in Appendix B would continue to shape the recreation opportunities and ROS settings available on the Forest. It is anticipated that the effects of the present and reasonably foreseeable future actions would meet ROS classifications for the management area in which they occur.

Measurement indicators 1, 2, 3, 4, and 5 were used in the cumulative effects analysis. Measurement indicator 1 looks at the impact of proposed changes to the NFTS on ROS. No ROS plan amendments would be needed for any alternatives because all routes proposed for addition to the NFTS comply with the ROS class in the associated management area. No proposed route additions in the action alternatives

would be located in primitive or semi-primitive non-motorized ROS classes. All proposed route additions would be located in semi-primitive motorized, roaded natural, or rural ROS classes. All action alternatives would be consistent with ROS. Therefore, no cumulative effects on ROS are anticipated for the action alternatives. For potential cumulative effects on ROS for the no action alternative, see the cumulative effects section for the no action alternative, alternative 1, below.

Measurement indicator 2 looks at the impact of proposed changes to the NFTS on non-motorized recreation (dust, noise, use conflicts). It also addresses the "quiet" recreation issue. Quiet recreation is defined by measurement indicator 2 as the acres outside ½ mile of an area where motorized use is allowed. For cumulative effects analysis, quiet recreation acreage for the no action alternative was determined using the existing NFTS, other state, county, or private roads traveling through the Forest, and the currently identified unauthorized routes. Quiet recreation acreage for the action alternatives was determined using the existing NFTS, other state, county, or private roads traveling through the Forest, and any proposed route and area additions. See Table 9 for a full comparison of alternatives regarding this indicator.

Measurement indicator 3 looks at the impact of proposed changes to the NFTS to motorized recreation opportunities by alternative by analyzing roads, motorized trails, and areas added to the NFTS. The total motorized mileage in an alternative includes proposed route additions mileage and motorized NFTS mileage, considered to be operational MLs 2-5. See Table 10 for a full comparison of alternatives regarding this indicator.

Measurement indicator 4 looks at the impact of proposed changes to the NFTS to motorized access to dispersed recreation opportunities by alternative by analyzing number of dispersed sites accessed as a result of the additions identified in Measurement indicator 3. See Table 15 for a full comparison of alternatives regarding this indicator.

Measurement indicator 5 looks at the impact of proposed changes to the NFTS on neighboring private and federal lands by alternative by analyzing the number of miles that occur within ½ mile of neighboring lands. For alternative 1, routes considered were open roads on the existing NFTS and inventoried unauthorized routes. For the action alternatives routes considered were open roads on the existing NFTS and any proposed route and area additions. See Table 16 for a full comparison of alternatives regarding this indicator.

Present and foreseeable future actions which add roads to the system as ML 2 would benefit motorized recreation by increasing the mileage available for motorized recreation opportunities. Adding ML 2 roads may have a negative effect on non-motorized opportunities due to an increase in noise, dust, physical presence, and possible use conflicts between motorized and non-motorized recreation opportunities and by potentially affecting neighboring private and federal lands and wilderness areas by increasing dust, noise, and physical presence when located within ½ mile from these areas. Changing from ML 3 to ML 2 would provide more motorized recreation opportunity since ML 2 roads are generally

open to mixed use. In the present and reasonably foreseeable future, about 25.04 miles of road would be added as ML 2 and about 3.6 miles of road would be changed from ML 3 to ML 2.

Roads added as a ML 1 are not anticipated to have cumulative effects on recreation resources since it is assumed these routes would meet ROS classifications for the management area in which they occur. Roads changed to a ML 1 would decrease motorized recreation opportunity since these routes would be closed to motorized use when they were previously open to motorized use. In the present and reasonably foreseeable future, about 6.7 miles of road would be changed from ML 2 to ML 1.

Decreased access to recreation opportunities and increased dust, noise and physical presence of machinery may occur during road reconstruction activities. Road decommissioning would benefit non-motorized opportunities by eliminating noise, dust, and physical presence of motorized vehicles on neighboring private and federal lands and wilderness areas when located within ½ mile from these areas, but may negatively affect motorized recreation by decreasing the mileage available for motorized recreation opportunities. Road decommissioning may also increase the amount of forest available for "quiet" recreation opportunities. In the present and reasonably foreseeable future, about 12.7 miles of currently open NFTS roads would be decommissioned.

These present and reasonably foreseeable future roads actions were used to determine the cumulative effect on NFTS roads open to motorized recreation opportunities. NFTS roads considered open to motorized travel include MLs 2 through 5. The present and reasonably foreseeable future road actions would result in an overall increase of about 5.64 miles to the open NFTS roads in each alternative. The cumulative effects analysis includes the effects of the three management actions discussed in the environmental consequences section: (1) the prohibition of cross-country motorized travel, (2) additions of currently unauthorized routes to the NFTS, and (3) changes to the existing NFTS.

Alternative 1 – No Action

Unrestricted cross-country motorized travel under this alternative has the potential to create resource issues in the future and a proliferation of user created dead-end routes that may reduce the quality of the motorized recreation experience.

Although consistent with LRMP guidance for ROS, cross-country motorized travel may affect ROS class settings. Motorized use could inadvertently spread to non-motorized areas, changing areas with non-motorized ROS class settings, such as semi-primitive non-motorized, to ROS classes with motorized settings such as semi-primitive motorized, roaded natural, or rural.

This alternative has the greatest potential to negatively alter non-motorized recreation settings as it is difficult to predict where future cross-country motorized use would occur. Dust, noise, and motorized vehicle presence may impact non-motorized recreationists seeking a "quiet" recreation experience. Cumulatively under this alternative, 65.2 percent of the Klamath NF would be affected by motorized use and would not be available for "quiet" recreation, the greatest amount of all the alternatives (see Table 9).

This alternative also has the greatest impact on neighboring private and federal lands and wilderness areas, as determined using measurement indicator 5, with about 2,031 miles of NFTS open roads and unauthorized motorized routes occurring within ½ mile of neighboring private and federal lands (see Table 16), the highest amount when compared to all the alternatives. This alternative has the highest potential cumulative impact on non-motorized recreation opportunities and neighboring federal and private lands and wilderness areas.

With no proposed additions or changes to the use of existing NFTS roads or trails and no prohibition of cross-country motorized travel, this alternative results in no change to the existing motorized recreation opportunities. Since there are no direct or indirect effects to motorized recreation and no change from the current management situation, no cumulative effects to motorized recreation would result.

Alternative 2 – Proposed Action

Cumulative Effects of all proposed management actions include:

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel

2. Direct/indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

This alternative has the potential to negatively alter non-motorized recreation settings when considering the proposed route additions, the existing NFTS, and other roads traveling through the Forest. Dust, noise, and motorized vehicle presence may impact non-motorized recreationists seeking a “quiet” recreation experience. Cumulatively under this alternative, 64.3 percent of the Klamath NF would be affected by motorized use and would not be available for “quiet” recreation, less than the no action alternative, but most among the action alternatives (see Table 9). This alternative, combined with the past, present and reasonably foreseeable future actions, also has the potential to impact neighboring private and federal lands and wilderness areas. About 1,851.31 miles of NFTS open roads and proposed route additions occur within ½ mile of neighboring private and federal lands and wilderness areas (see Table 16). The proposed route additions provide for a three percent increase from the current condition of open NFTS roads occurring within ½ mile of neighboring private and federal lands and wilderness areas. This alternative has the highest potential cumulative impact on non-motorized recreation opportunities among the action alternatives, but less of an impact than the no action alternative or the current condition.

This alternative would have beneficial cumulative effects to motorized recreation by increasing NFTS mileage available for motorized recreation. Proposed route additions contribute to a variety of riding experiences as well as the continuity of the motor-touring opportunities. The route additions also provide loops, connectors, and access to a diversity of dispersed recreation activities which can benefit both

motorized and non-motorized recreation opportunities by providing access to trailheads, dispersed campsites etc. Proposed road additions and open NFTS roads would provide about 3,827.96 miles of motorized recreation opportunity, more than the other action alternatives and the current condition (see Table 10). Combined with the present and reasonably foreseeable future road actions about 3,833.60 miles of motorized recreation opportunity would be provided. Proposed mixed use, which adds vehicle classes to the NFTS, would benefit motorized recreation by increasing the diversity of motorized opportunities. Alternative 2 when combined with the existing NFTS ML 2 roads would provide for about 2,865 miles of mixed use motorized opportunity, more than the no action alternative and alternatives 3 and 6 but less than alternatives 4 and 5 (see Table 11).

Alternative 3 – Existing NFTS

Cumulative Effects of all proposed management actions include:

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel

2. Direct/indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

This alternative has the potential to alter non-motorized recreation settings. Dust, noise, and motorized vehicle presence may impact non-motorized recreationists seeking a “quiet” recreation experience. Cumulatively under this alternative, 64.1 percent of the Klamath NF would be affected by motorized use and would not be available for “quiet” recreation, the same as alternative 4 and the least of all the alternatives (see Table 9). Only the existing NFTS and other state, county, or private roads traveling through the Forest were considered for alternative 3. This alternative, combined with the past, present and reasonably foreseeable future actions, also has the potential to impact neighboring private and federal lands. About 1,801 miles of NFTS open roads occur within ½ mile of neighboring private and federal lands (see Table 16), providing less potential cumulative impact on neighboring federal and private lands than alternatives 1, 2, 5, and 6. This alternative and alternative 4, when compared to the other action alternatives and the current condition, have the most beneficial cumulative impact to non-motorized recreation opportunities.

The open NFTS roads would provide about 3,753 miles of motorized recreation opportunity, less than all the action alternatives (see Table 10). Combined with the present and reasonably foreseeable future road actions about 3,758.64 miles of motorized recreation opportunity would be provided. This alternative has the most potential cumulative impact on motorized users by providing fewer motorized recreation opportunities than the current condition. All cross-country travel would be prohibited, and no route additions, area additions, or mixed use would be proposed. Mixed use on existing NFTS ML 2 roads

would provide for about 2,746 miles of mixed use motorized opportunity, least among the action alternatives (see Table 11).

Alternative 4 – Add Fewer Routes

Cumulative Effects of all proposed management actions include:

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel

2. Direct/indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

This alternative has the potential to negatively alter non-motorized recreation settings when considering the proposed route additions, the existing NFTS, and other roads traveling through the Forest. Dust, noise, and motorized vehicle presence may impact non-motorized recreationists seeking a “quiet” recreation experience. Cumulatively under this alternative, 64.1 percent of the Klamath NF would be affected by motorized use and would not be available for “quiet” recreation, the same as alternative 3 and the least of all the alternatives (see Table 9). Although alternative 4 proposes route additions, these route additions are in close enough proximity to the existing NFTS that cumulatively their effect on “quiet” recreation is the same as alternative 3. This alternative, combined with the past, present and reasonably foreseeable future actions, also has the potential to impact neighboring private and federal lands. About 1,800.57 miles of NFTS open roads and proposed route additions occur within ½ mile of neighboring private and federal lands (see Table 16), providing the least potential cumulative impact on neighboring federal and private lands. The proposed route additions provide for no change from the current condition of open NFTS roads occurring within ½ mile of neighboring private and federal lands. This alternative and alternative 3, when compared to the other action alternatives and the current condition, have the most beneficial cumulative impact to non-motorized recreation opportunities.

This alternative would have beneficial cumulative effects to motorized recreation. Proposed route additions contribute to a variety of riding experiences as well as the continuity of the motor-touring opportunities. The route additions also provide loops, connectors, access to a diversity of dispersed recreation activities, which can benefit both motorized and non-motorized recreation opportunities by providing access to trailheads, dispersed campsites etc. Proposed road additions and open NFTS roads would provide about 3,746.16 miles of motorized recreation opportunity, more than alternatives 1 and 3 but less than alternatives 2, 5, and 6 (see Table 10). Combined with the present and reasonably foreseeable future road actions about 3,751.80 miles of motorized recreation opportunity would be provided. Proposed mixed use, which adds vehicle classes to the NFTS, would benefit motorized recreation by increasing the diversity of motorized opportunities. Alternative 4 when combined with the

existing NFTS ML 2 roads would provide for about 2,867.59 miles of mixed use motorized opportunity, more than the no action alternative and alternatives 2, 3, and 6 but less than alternative 5 (see Table 11).

Alternative 5 – Add More Routes

Cumulative Effects of all proposed management actions include:

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel

2. Direct/indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

This alternative has the potential to negatively alter non-motorized recreation settings when considering the proposed route additions, the existing NFTS, and other roads traveling through the Forest. Dust, noise, and motorized vehicle presence may impact non-motorized recreationists seeking a “quiet” recreation experience. Cumulatively under this alternative, 64.2 percent of the Klamath NF would be affected by motorized use and would not be available for “quiet” recreation (see Table 9). This alternative, combined with the past, present and reasonably foreseeable future actions, also has the potential to impact neighboring private and federal lands and wilderness areas. About 1,835.03 miles of NFTS open roads and proposed route additions occur within ½ mile of neighboring private and federal lands and wilderness areas (see Table 16). The proposed route additions provide for a two percent increase from the current condition of open NFTS roads occurring within ½ mile of neighboring private and federal lands and wilderness areas. This alternative has more beneficial cumulative impact to non-motorized recreation opportunities than current condition and alternative 2.

This alternative would have beneficial cumulative effects to motorized recreation. Proposed route additions contribute to a variety of riding experiences as well as the continuity of the motor-touring opportunities. The route additions also provide loops, connectors, access to a diversity of dispersed recreation activities, which can benefit both motorized and non-motorized recreation opportunities by providing access to trailheads, dispersed campsites etc. Proposed road additions and open NFTS roads would provide about 3,797.91 miles of motorized recreation opportunity, more than alternatives 1, 3, 4, and 6 but less than alternative 2 (see Table 10). Combined with the present and reasonably foreseeable future road actions about 3,803.55 miles of motorized recreation opportunity would be provided. Proposed mixed use, which adds vehicle classes to the NFTS, would benefit motorized recreation by increasing the diversity of motorized opportunities. Alternative 5 when combined with the existing NFTS ML 2 roads would provide for about 3,127.11 miles of mixed use motorized opportunity, more than all the other alternatives (see Table 11).

Alternative 6 – Refined Proposed Action

Cumulative Effects of all proposed management actions include:

1. Direct/indirect effects of the prohibition of cross-country wheeled motorized vehicle travel

2. Direct/indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class

3. Direct/indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

This alternative has the potential to negatively alter non-motorized recreation settings when considering the proposed route additions, the existing NFTS, and other roads traveling through the Forest. Dust, noise, and motorized vehicle presence may impact non-motorized recreationists seeking a "quiet" recreation experience. Cumulatively under this alternative, 64.2 percent of the Klamath NF would be affected by motorized use and would not be available for "quiet" recreation, the same as alternative 5 (see Table 9). This alternative, combined with the past, present and reasonably foreseeable future actions, also has the potential to impact neighboring private and federal lands and wilderness areas. About 1,830.65 miles of NFTS open roads and proposed route additions occur within ½ mile of neighboring private and federal lands and wilderness areas (see Table 16). The proposed route additions provide for a two percent increase from the current condition of open NFTS roads occurring within ½ mile of neighboring private and federal lands and wilderness areas. This alternative has more beneficial cumulative impact to non-motorized recreation opportunities than current condition and alternative 2.

This alternative would have beneficial cumulative effects to motorized recreation. Proposed route additions contribute to a variety of riding experiences as well as the continuity of the motor-touring opportunities. The route additions also provide loops, connectors, and access to a diversity of dispersed recreation activities, which can benefit both motorized and non-motorized recreation opportunities by providing access to trailheads, dispersed campsites etc. Proposed road additions and open NFTS roads would provide about 3,785.54 miles of motorized recreation opportunity, more than alternatives 1, 3, and 4 but less than alternatives 2 and 5 (see Table 10). Combined with the present and reasonably foreseeable future road actions about 3,791.18 miles of motorized recreation opportunity would be provided. Proposed mixed use, which adds vehicle classes to the NFTS, would benefit motorized recreation by increasing the diversity of motorized opportunities. Alternative 6 when combined with the existing NFTS ML 2 roads would provide for about 2,853.55 miles of mixed use motorized opportunity, more than the no action alternative and alternative 3 but less than alternatives 2, 4 and 5 (see Table 11).

Summary of Effects Analysis across All Alternatives

This section summarizes the effects analysis by discussing how well each alternative addresses the recreation resource for each measurement indicator and discusses how each alternative addresses non-motorized recreation and motorized recreation.

The non-motorized recreation measurement indicators summarized here include: non-motorized recreation opportunity and impact of proposed changes to the NFTS on neighboring private and federal lands and wilderness areas (dust, noise, use conflicts). Alternative 1 would have the most impact on non-motorized recreation opportunity and the most impact on neighboring private and federal lands and wilderness areas (dust, noise, use conflicts) in that continued cross-country motorized travel would have the most impacts on these measurement indicators in the long term. Alternatives 3 and 4 would have the least impact regarding these measurement indicators by providing the most non-motorized recreation opportunity and reducing the impact of proposed changes to the NFTS on neighboring private and federal lands and wilderness areas (dust, noise, use conflicts). The overall difference between alternatives 3 and 4 regarding these measurement indicators is minimal. Alternatives 2, 5, and 6 would also provide beneficial effects to non-motorized recreation and reduce impacts on neighboring private and federal lands and wilderness areas by prohibiting cross-country motorized travel. However, these alternatives would provide slightly less beneficial effects regarding these measurement indicators when compared to alternatives 3 and 4.

The motorized recreation measurement indicators summarized here include: motorized recreation opportunity and type of motorized access to dispersed recreation. Alternative 3 would have the most impact on motorized recreation opportunity and the most impact on type of motorized access to dispersed recreation. With no route additions or mixed use roads proposed in alternative 3, this alternative would have the most impacts on these measurement indicators in the short and long term. Alternative 1 would have the least impact regarding these measurement indicators by providing the most motorized recreation opportunity and the most motorized access to dispersed recreation. Alternative 1 would be the most beneficial to motorized recreation opportunity, since cross-country motorized travel would continue. Alternative 4 provides slightly more motorized recreation opportunity and motorized access to dispersed recreation than alternative 3, but is not as beneficial to motorized recreation opportunity as alternatives 2, 5, and 6. Alternatives 2, 5, and 6 would provide beneficial effects to motorized recreation and motorized access to dispersed recreation by proposing route additions and mixed use opportunities. Of the action alternatives, alternatives 2 and 5 provide the most motorized recreation opportunity and motorized access to dispersed recreation. The overall difference between alternatives 2 and 5 regarding these measurement indicators is minimal. Alternative 6 provides slightly less motorized opportunity that alternatives 2 and 5, but more than alternatives 3 and 4.

Compliance with the Forest Plan and Other Direction

Klamath NF Land and Resource Management Plan

Alternative 1 implements the Klamath National Forest LRMP, which allows cross-country motorized travel on most land allocations. However, the LRMP, as written, is not in compliance with the Travel Management Rule. No motor vehicle use map would be produced.

Alternatives 2, 3, 4, 5, and 6 would require a Forest Plan amendment to prohibit cross-country motorized travel. The action alternatives comply with all other Forest Plan standards and guidelines, as well as any state or federal regulatory direction identified in the regulatory framework section.

Wild and Scenic River Act

Routes which provide access to dispersed recreation on the Klamath River, Scott River, North Fork and South Fork Salmon River and Salmon River are proposed for addition to the NFTS under alternatives 2, 5, and 6. These rivers were formally included within the National Wild and Scenic River system in 1981, to protect their "outstandingly remarkable" fisheries values and their free-flowing condition. With the exception of one segment of the Scott River, these rivers are further classified as "Recreational" Wild and Scenic Rivers. The Recreational classification applies to those rivers or sections of rivers that are free-flowing, readily accessible by road or railroad, may have some development along the shorelines and may have undergone some impoundment or diversion in the past (USDA Forest Service, 1995). One segment of the Scott River is classified as a "Scenic" Wild and Scenic River, due to its largely undeveloped condition. The Scenic classification applies to those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but may be accessible in places by roads (USDA Forest Service, 1995). The proposed facilities under these alternatives would meet LRMP standards and guidelines, the Aquatic Conservation Strategy, the Clean Water Act and all other requirements necessary to protect and enhance outstandingly remarkable and other pertinent values of the Forest's Wild and Scenic Rivers.

3.8 Hydrology

3.8.1 Introduction

Protection of water quantity and quality is an important part of the mission of the Forest Service (Forest Service Strategic Plan for 2007 to 2012, July 2007). Management activities on National Forest System (NFS) lands must be planned and implemented to protect the hydrologic functions of forest watersheds, including the volume, timing, and quality of stream flow. The use of roads, trails, and other areas on national forests for public operation of motor vehicles has the potential to affect these hydrologic functions through interception of runoff, compaction of soils, and detachment of sediment (e.g., Foltz, 2006). Management decisions to eliminate cross-county motor vehicle travel, add new routes and areas to the National Forest Transportation System (NFTS), and make changes to the existing NFTS must consider effects on watershed functions.

3.8.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action 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.

Non-point source pollution on national forests is managed through the **Regional Water Quality Management Plan (USDA Forest Service, Pacific Southwest Region, 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) (project file:Klamath_Travel_BMPs.doc). All NFS roads and trails open to OHV use are required to comply with these BMPs.

Of particular relevance for motor vehicle travel 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 routes. 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 proposed action is section 13369, which deals with non-point source pollution and best management practices.

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.

Klamath National Forest Land and Resource Management Plan (LRMP; Klamath NF, 1995) gives the Forest-wide Standards and Guidelines for the Water Resource (S&G 4-1 and 4-2). These are augmented by standards and guidelines for each management area affected by the proposed action. It also includes the Aquatic Conservation Strategy (ACS) standards and guidelines (S&G 6-22 through 6-49). The ACS standards and guidelines require that a watershed analysis be conducted prior to management activities as a basis for ecosystem planning and management, and that watershed restoration should focus on removing and upgrading roads. Riparian Reserve standards and guidelines (S&G MA10-1 through MA10-77) require that each existing or planned road meet ACS standards and avoid wetlands. Adding unauthorized routes to the NFTS in meadows or wetlands constitutes road construction, and should be avoided.

Klamath National Forest Wet Weather Operations Standards (WWOs) 2002. This document provides guidelines to determine if conditions are favorable for wet weather/winter activities and to provide guidance as to when conditions warrant suspension of activities, when activities may begin or resume, or when and what remedies may be appropriate. These guidelines also provide additional measures to protect the transportation system, maintain water quality, and preserve the soil resource.

3.8.3 Effects Analysis Methodology

The hydrologic analysis was in two phases. First, the GIS forest roads layer was queried using criteria such as unauthorized route, total road density (authorized and unauthorized), number of road crossings and whether or not a road was in a municipal watershed to determine if roads should be maintained as “open” in the travel management system. .Screening criteria sources were the Klamath National Forest LRMP, the Clean Water Act, Best Management Practices, the Endangered Species Act, and the North Coast Regional Water Quality Board Basin Plan, as well as professional judgment.

The second phase of the analysis focused on field reviews of unauthorized routes in the action alternatives. Approximately 30 miles of unauthorized routes within the action alternatives were field reviewed, out of a potential of about 480 miles of public identified unauthorized routes and 30 miles of access to dispersed recreation sites. Over 32 miles of unauthorized routes were not considered for inclusion in proposed actions after field investigation, either because of stream proximity, existing high road density, or roads were within a municipal watershed or key watershed.

Assumptions specific to analysis

- Soil compaction, or elimination, altered hill slope drainage, and elimination of vegetation on travel routes are effects that will persist, generally, 30 + years following prohibition of public motor vehicle use.
- Motorized use is the predominant cause of sediment production from native-surface routes.
- Spatial boundary for the effects analysis is the forest boundary. Within the forest boundary, specific areas that require analysis include hydrologically sensitive areas and inventoried unauthorized routes. Cumulative watershed effects are analyzed for Hydrologic Unit Code (HUC) 7th field watersheds.
- Hydrologically sensitive areas include all designated riparian protection areas, such as riparian reserves, streamside exclusion zones, streamside management zones, and riparian conservation areas. All areas of perennial and seasonal standing or running surface water and areas of perennially or seasonally saturated soil are included. Examples of hydrologically sensitive areas include streams, lakes, reservoirs, fens, wet meadows, marshes, and unstable hill slopes.

3.8.4 Data Sources

- Route inventories collected in step 1 of travel management and associated tabular data sets.
- GIS analyses of route miles and stream crossings in hydrologically sensitive areas, including the KNF Forestwide Road Analysis.
- Air and ground photos and anecdotal information documenting the time required for passive restoration of routes closed to motor vehicle traffic (recovery time may vary based on precipitation, elevation, aspect, and other factors).

3.8.5 Water Resource Indicators

- Miles of unauthorized routes/routes proposed for addition to the NFTS in hydrologically sensitive areas, which are within 340 feet of fish-bearing streams, lakes and other water bodies, and 160 feet of non-fish bearing steams, and unstable ground.
- Miles of unauthorized routes/routes proposed for addition to the NFTS with existing surface erosion in hydrologically sensitive areas on the forest.
- Miles of routes with documented surface erosion features.
- Density of route miles within a HUC 7 watershed (cumulative effects).

3.8.6 Water Resources Methodology by Action

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

Considerations: The principle effects of cross-country motor vehicle travel are increased partial year peak flows (Wright et al, 1990, Thomas and Megahan, 1998, Jones, 2000) for small watersheds only, and fine sediment (<0.4mm diameter particles) transported by runoff from running surfaces (Bilby et al, 1989, Forsyth et al, 2006, Sheridan et al, 2006). The effect of the prohibition on cross-country motor vehicle travel would be to end traffic on routes and areas beyond the authorized NFTS. In the short term, there would be a significant decrease in sediment production from unauthorized roads (Reid and Dunne, 1984). Benefits from prohibition of use of unauthorized motorized trails would be muted as the response to runoff and sediment yield is much more variable and problematic (Foltz, 2006). In the long term, some or all unauthorized routes and areas would probably revegetate and regain some of their hydrologic and geomorphic functions, although use of these routes by non-motor vehicle traffic could delay or prevent recovery.

Short-term timeframe: 1 year.

Long-term timeframe: > 30 years, based on observation of recovery of routes in the Forest by resource staff (Laurent, 2009, personal communication).

Spatial boundary: Klamath National Forest boundary.

Indicator(s): Miles of unauthorized routes in hydrologically sensitive areas.

Methodology: GIS analysis of existing unauthorized routes within riparian reserves, 340 feet of wetlands or other water bodies, or geologically unstable ground.

Rationale: Published studies (Reid and Dunne, 1984, Bilby et al, 1989, Forsyth et al, 2006, Sheridan et al, 2006) have documented that erosion of native-surface roads is increased by traffic.

Comments: The short-term effects will be reductions in traffic-related sediment and related pollutants. Short-term effects will essentially be the same for all action alternatives. The effects of the action alternatives will differ from the effects of the no-action alternative because the elimination of traffic from the unauthorized routes will reduce sediment from motor vehicle use. The long-term effects will be the same for all action alternatives and less pronounced than short-term effects. Effects for the action alternatives will be overall less adverse than the no-action alternative.

2. Direct/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: > 30 years.

Spatial boundary: Klamath National Forest boundary.

Indicator(s): (1) sum of the route miles proposed for addition to the NFTS in hydrologically sensitive areas on the forest; (2) sum of route miles with documented surface erosion.

Methodology: Query of GIS data base of Forest and project routes. Field review of 30 miles of unauthorized routes was conducted in the 4 watersheds most affected by addition to NFTS.

Rationale: Forest roads may alter hill slope drainage by moving precipitation water on the surface, increasing hydrologic connectivity or advancing peak flows.

Comments: Adoption of a limited operating period (LOP), and wet weather operation standards (WWOs) would mitigate some of the short term effects.

3. Changes to the existing NFTS [changing the vehicle class].

Short-term timeframe: 1 year

Long-term timeframe: > 30 years.

Spatial boundary: Klamath National Forest boundary

Indicator(s): (1) sum of route miles and areas proposed for changes in hydrologically sensitive areas; (2) sum of route miles with documented surface erosion.

Methodology: GIS data base query.

Rationale: Changes in traffic volume could affect production of fine sediment from running surfaces. Miles of routes in riparian reserves and other areas “hydrologically connected” is an index to potential effects.

4. Cumulative Effects

Long-term timeframe: > 30 years.

Spatial boundary: Klamath National Forest boundary **Indicator(s)**: Density of route miles by 7th field HUC watersheds.

Methodology: Action alternatives are compared to existing condition (alternative 1) using project GIS data base for each HUC 7th field watershed affected.

Rationale: Regional cumulative effects methods index disturbed ground on a watershed basis by normalizing each affected area (past, proposed and future) to a severely compacted forest road, in units called equivalent roaded acres (ERA). Results are presented as proportions (percent ERA) of a watershed area. Current cumulative effect estimates (percent ERA) are given in the Affected Environment section

(Table 19 and Table 20 below). Road projects are the only long term effects analyzed, for this and other foreseeable actions. Changes in NFTS route density, a similar measurement to percentage, are a reasonable presentation of changes to long term effects.

Amount of disturbed ground required to change peak flow, at the limit of detection, was found by Grant et al (2008) to be the equivalent of 3 to 4 miles of roaded area per square mile. Limit of detection was considered to be ± 10 percent which is the standard error for standard instrumentation to measure flow. For the purposes of this analysis cumulative effects will be considered significant when there is 10 percent or more change in route density in a HUC 7th field watershed.

3.8.7 Affected Environment/Environmental Consequences

Affected Environment

Table 19 lists 7th field HUC west side forest watersheds that have proposed additional routes to the NFTS in any of the action alternatives. All are either in the Klamath or Salmon River watersheds. The Klamath River is listed by the state, under section 303(d) of the Clean Water Act, as impaired for temperature and nutrients (State of California, 2006a). State water quality control staff recommends future delisting for temperature and nutrients based on further data, but propose listing for sedimentation (State of California, 2006b). Beaver/Grouse, Buckhorn, Clear Creek, Long John Creek, Lower Humbug, Middle Fork Humbug, Upper Humbug and Vesa Creek are all tributary to the Klamath River. The Salmon River is 303(d) listed for temperature and sediment. Crapo Creek and Kanaka/Olson are cold water tributaries to the Salmon River. Crapo supports approximately ½ mile of anadromous habitat.

There are 40 HUC 7th field watersheds with unauthorized routes proposed for addition to the NFTS, under the various alternatives. There are 510 miles of inventoried unauthorized roads and trails within these watersheds. The land area is 559.5 square miles within the 40 watersheds. The total mileage of current system roads, including private, county and state ownership as well as forest service is 1,615 miles, for a road density of 2.89 miles per square mile. The total route density (system roads and unauthorized routes) is 3.78 miles per square mile. Altogether, there is currently 508,000 acres of Forest land open to cross-country travel. This is land that is both outside areas where cross-country travel is prohibited, and under 35 percent gradient.

Humbug Creek is 303(d) listed for copper, mercury and sediment, sources are from abandoned mines.

Crapo and Kanaka-Olsen watersheds are tributaries of the Salmon River. Kanaka Creek is 303(d) listed for arsenic, sources from abandoned mines (State of California, 2006a).

The west side watersheds (western part of forest which is roughly delineated as the coast range mountains) are all considered cold water sources for anadromous fisheries values in the Klamath and Salmon Rivers. Other beneficial uses on the west side watersheds include recreation and minor amounts of domestic or agricultural intakes (State of California, 2006a).

Table 19. West side watersheds with proposed additions to NFTS, showing current CWE calculations

7th Field Watershed	Acres	Current % ERA	TOC in %ERA
Buckhorn	9,153	6.0	8.0
Beaver/Grouse	6,497	3.9	7.0
Clear	2,775	3.6	10.5
Crapo Creek	11,067	6.1	7.5
Kanaka/Olsen	8,288	8.0	8.0
Long John/Doe	5,677	4.0	8.0
Middle Fork Humbug	4,998	2.1	10.0
Upper Humbug	7,994	2.5	9.5
Vesa Creek	3,146	1.0	11.5

Table 19 shows Buckhorn and Kanaka/Olsen watersheds with elevated risk levels. This is because of disturbance from wildfires and subsequent timber salvage operations. Kanaka/Olsen also has high road densities. The Buckhorn watershed has a high percentage of private industry ownership. The Forest has a road restoration and decommissioning program planned for future actions in the Kanaka/Olsen watershed to address this problem.

Table 20. East side watersheds with proposed additions to NFTS, showing current CWE calculations

7th Field Watershed	Acres	Current % ERA	TOC in %ERA
Antelope Sink	9,798	5.0	11.0
Antelope Well	5,039	2.78	16.5
Bray/Butte	9,088	1.47	11.0
Callahan Lava	11,421	2.87	16.5
Davis Gulch	10,518	2.7	12.5
Dock Well	8,096	2.6	17.0
Garner Mtn.	11,961	4.5	13.0
Grass Lake NE	5,475	7.7	13.0
Grouse Hill	9,731	4.6	17.0
Haight Mtn.	8,457	4.9	11.0
Hill 22	3,709	4.0	16.5
Long Prairie	3,022	0.7	13.0
Lower First C.	3,597	5.2	11.0
Main Horsethief	7,849	2.0	12.0
Meiss Lake	2,183	1.0	12.5
Mud Lake	7,858	2.8	13.0
Pollic Flat	11,847	3.7	12.5

7th Field Watershed	Acres	Current % ERA	TOC in %ERA
Prather C.	9,481	3.2	11.5
Round Valley	9,021	2.9	13.0
Sharp Mtn.	4,535	1.0	13.0
Tamarack Flat	10,600	2.2	16.5
Tecnor	8,714	1.0	13.0
Tennant-Antelope	8,175	5.4	11.5
Trapper C.	2,572	4.0	12.5
Up. First C.	7,039	5.3	12.0
Up. Shovel C.	6,856	2.1	10.5
Van Bremmer Well	5,390	4.2	13.5
W. Red Rock Valley	3,930	0.8	13.0
Whaleback West Slope	12,485	7.1	16.5

The beneficial uses on the east side watershed are limited resident fisheries and dispersed recreation sites. There are no water quality issues or impaired streams listed with the state under section 303(d).

Cumulative watershed effect (CWE) analysis was complete in 2004 for the west side. Values from this run plus additional work completed in 2009 for McBaldy timber sale, which covers some of the project watershed, is presented in Table 19. The table gives the existing situation within the analysis area for the west side watersheds, and as such it represents alternative 1 the no action alternative. Table 19 shows current ERA analysis for east side watersheds based on 2004 runs (eastside is Gooseneck Ranger District; that portion of the forest east of Interstate 5).

Environmental Consequences

Alternative 1 – No Action

Direct and indirect effects of prohibition of cross-country motor vehicle travel:

Primarily, the hydrologic effect of forest roads is to alter hill slope drainage by intercepting precipitation either directly, as it falls on impervious surfaces, or indirectly as groundwater flow emerging at the road cut face. Depending on the engineered drainage of a road, intercepted water may be transported to streams much faster than would occur naturally, augmenting peak flows and altering their timing (Jones and Grant, 1996; Wemple and Jones, 2003). In addition, water flowing off of running surfaces of roads will readily transport in suspension sediment less than 0.5mm in diameter. This class of sediment is particularly injurious in fish-bearing steams where it clogs the interstitial pores in gravel beds, cutting off the circulation of water critical to eggs and emergent fry.

These concerns notwithstanding, numerous and extensive research has shown to date even dense networks of roads concomitant with other management such as harvested slopes in the western United States do not affect peak flows in watersheds over about 3,500 acres. Even for much smaller watersheds impacts from management usually affect only small peaks occurring at much less than one year frequency, and not of size to scour channels (Ziemer, 1998, Beschta et al, 2000; Jones, 2000). Further, mean annual peak flows in themselves doesn't always reflect peak flow changes at the 7th Field scale. These affects may be seen at the 8th Field scale or smaller watershed.

However, for roads where drainage runs directly as surface flow, either at crossings or rutted relief drains, research has also shown that roads can add significant and possibly egregious amounts of fine sediment to a natural system (Bilby, 1989).

With the no-action alternative there would be no prohibition on cross-country travel. Under the current Forest Plan about 70 percent of the Forest is open to unrestricted OHV use, although only 508,000 acres are usable by OHVs due to slope.

If the current condition were to continue there are no expected additional direct or indirect effects from the existing unauthorized routes. There will be no improvement in road-related sedimentation or run-off characteristics of small watersheds.

Direct and indirect effects of adding routes to the NFTS:

There would be no routes added to the NFTS.

Changes to existing NFTS: There would be no changes in vehicle class on any current routes in the NFTS.

Cumulative Effects

Cumulative effects are displayed in Table 19 and Table 20 above, representing the current condition.

Alternative 2 – Proposed Action

Direct and indirect effects of prohibition of cross-country motor vehicle travel:

Direct effects from the proposed action would be a likely substantial decrease overall in suspended sediment and runoff yield from road and trail surfaces. Within 40 7th field watersheds, a total of 13 miles of trails and roads would be brought into the transportation system within hydrologically sensitive areas, and about 71 miles would no longer be used, a reduction of 85 percent. Forest-wide the reduction of routes in hydrologically sensitive areas would total about 101 miles.

In the long term, undesignated routes would revegetate, increasing infiltration capacity of running surfaces through natural decompaction, mitigating road-directed runoff. In many cases sloughing hill slopes would further disperse runoff from compacted running surfaces without directly leading to sources of sediment to channels.

Direct and indirect effects of adding facilities to the NFTS:

A total of about 92 miles of roads and motorized trails would be added to the NFTS. About 12 miles of proposed routes were field reviewed in the Middle Fork Humbug and Upper Humbug and Clear Creek HUC 7th field watersheds (40 percent of total), because these are tributary to the Klamath River. Klamath River and Humbug Creek are both listed as impaired by the state Regional Water Quality Control Board (State of California, 2006a). Evident surface erosion was found on 4.7 miles of reviewed routes, 1.6 miles of which were in riparian reserves.

This alternative would add 76 miles of roads and motorized trails to the NFTS in 35 7th field watersheds. Of these, 3.7 miles were field reviewed in the Upper and Middle Humbug watersheds and 0.48 miles found to have evident surface erosion on running surfaces or about 13 percent of miles reviewed, 1.2 miles were within riparian reserves.

These added routes would not recover as other unauthorized routes under the cross-country travel ban. These routes would continue to intercept and concentrate precipitation and groundwater flow into surface runoff contributing to erosion and sediment delivery to streams, and augmenting peak flows. The effects might be significant, and detectable, if the additional routes were to contribute to a total route density beyond about 3 miles per square mile (Grant et al, 2008). In this alternative, added routes would push the density of 3 7th field watersheds very close or significantly beyond this threshold (Antelope Well, Middle Fork Humbug and Upper Humbug). Additional routes in each of these watersheds would be in excess of 30 percent of the NFTS total. Antelope Well and Middle Fork Humbug would be close to the threshold of 3 miles per square mile (±10 percent). Upper Humbug would have a total of 4.28 miles per square mile. Other watersheds (11 in total) also would have existing density greater than 3 miles per square mile, but the alternative would not contribute substantially, more than 10 percent to the total.

Upper Humbug Creek 7th field watershed would have approximately 32 percent additional, authorized, routes in the NFTS (13 miles added for a total 54 in the watershed) in alternative 2. Many of these routes are motorized trails on ridge tops, so the degree of effects is uncertain, but the magnitude would probably exert a detectable change in hydrologic response; as augmented peak flow amount and advanced timing or duration.

Sixty-five acres of OHV use area (60 acres at Juniper Flat and 5 acres at Humbug Creek area) would be available for use. These two areas are roughly equivalent to 16.5 miles of road surface. Currently both areas are in a highly degraded state, largely unvegetated. A high degree of compaction prevails at Humbug Creek area, and rutting on slopes. The area mostly drains into a basin with problematic connection to the stream. Juniper Flat is on dry relatively non-cohesive soils. Wheel rutting is the prevalent disturbance. The watersheds on which Juniper Flat is situated are mostly interiorly drained (no outlet), or drainage is uncertain. There are no perennial streams. Intermittent channels largely disappear in the basalt flats to the west before reaching a flowing stream. At both sites in the short term it is likely that present conditions would persist, and in the long term that further degradation is likely. Juniper Flat poses no risk to water quality or riparian qualities. The Humbug area does not pose a significant risk because of infrequent or uncertain drainage connection to perennial streams.

Direct and indirect effects of changes to existing NFTS:

There are no effects to water quality from changing vehicle class on existing roads, as no significant increase in traffic volume is anticipated. Road surfaces are mostly hardened on these routes (paved or graveled) and maintenance level appropriate with passenger car use.

Cumulative Effects

Past, ongoing, and future effects are from continued use of roads and trails brought into the system and decreases in route density in all 40 7th field watersheds in which routes are brought into the system (see Table 21). Therefore, no adverse impacts to either water quality or peak flows from the alternative are

expected. Twenty-eight of the watersheds would have decreases in route density that may result in detectable and favorable hydrologic responses (Grant, et al, 2008). These watersheds could see reduced peaks or retardation of peak timing for small storm events, as well as decrease in fine sediment delivered to streams. The mixed use additions are not considered a change in route density. For all watersheds outside those affected by additions to the system, route density would decrease by some amount because of prohibition to cross country travel. A list of ongoing and foreseeable road-related activities is presented in Appendix B. These activities involve construction of new roads or decommissioning of system roads. These activities will add or subtract to total route density in 14 analyzed watersheds. Significant impacts in 6 watersheds from decreases in route density are shown in Table 22.

Alternative 3 – Cross-country Motorized Travel Prohibition Only – No Changes to the Current NFTS

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

Five hundred and ten miles of public-identified roads and motorized trails would be closed to motorized travel. Cross-country travel would be prohibited on 508,000 acres that is currently open on Forest land. Major effects of cross-country motor vehicle travel and route proliferation on water resources include increased peak flows and sediment loads due to compacted and non-vegetated route surfaces and detachment of sediment by vehicles.

In the short term, significant benefits would be expected in reduction of fine sediment (mostly < 0.5 mm in diameter) that is transported off of running surfaces of travel routes in hydrologically sensitive areas. Research shows that fine sediments make up at least 80 percent and usually much more of total sediment delivered from road use (Bilby et al, 1989; Forsyth, 2006). Sediment production from OHV trails is more variable and thus cessation of use would have more problematic results. Similarly, it has been demonstrated repeatedly that traffic volume is the primary agent of sediment production. Fines created during dry season, and usually the peak season of use, are washed away with the first storm events of each wet season (Luce and Black, 1999). Cessation of use should create almost immediate reductions in fine sediment yields overall. Across the forest 114 miles of routes in hydrologically sensitive areas would be affected.

Prohibited routes would still intercept and concentrate surface flows for some time. In the long term, some or all unauthorized routes and areas would probably revegetate and de-compact, regaining some or most of their hydrologic and geomorphic functions, although use of these routes by non-motor vehicle traffic could delay or prevent recovery.

Direct and indirect effects of adding routes to the NFTS:

No current unauthorized routes would be added to the NFTS.

Direct and indirect effects of changes to existing NFTS:

There would be no vehicle class changes to any routes within the NFTS.

Cumulative Effects

Density of routes would be reduced in all 7th field watersheds across the forest and significantly reduced in 30 watersheds that have proposed additions to NFTS routes (Table 21). Positive trends in runoff timing and peaks would be expected in these watersheds. No adverse impacts would be expected. Significance in this case is a watershed that would have a route density reduction of at least 10 percent.

Alternative 4 – Maximize Quiet Recreation Opportunities

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

There would be a general prohibition on cross-country travel on the forest, including 345 miles of identified unauthorized roads and trails. Short term benefits are reductions of fine sediments from running surfaces with direct surface drainage into streams Forest-wide. In alternative 4 about 2.4 miles of added routes would be in hydrologically sensitive areas, a reduction of about 98 percent from the current situation.

In the long term, some or all unauthorized routes and areas would probably revegetate and de-compact, regaining some or most of their hydrologic and geomorphic functions, although use of these routes by non-motor vehicle traffic could delay or prevent recovery.

Direct and indirect effects of adding routes to the NFTS:

This alternative adds about 38 miles of roads and motorized trails to the NFTS in 23 7th field watersheds. None of these routes were field reviewed.

These added routes would not recover as other unauthorized routes under the cross-country travel ban. These routes would continue to intercept and concentrate precipitation and groundwater flow into surface runoff contributing to erosion and sediment delivery to streams, and augmenting peak flows. The effects might be significant, and detectable, if the additional routes were to contribute to a total route density beyond about 3 miles per square mile (Grant et al, 2008). Eight watersheds would have existing density greater than 3 miles per square mile, but the alternative would not contribute substantially, more than 10 percent to the total.

Direct and indirect effects of changes to existing NFTS:

There are no effects to water quality from changing vehicle class on existing roads, as no significant increase in traffic volume is anticipated. Road surfaces are mostly hardened on these routes (paved or graveled) and maintenance level appropriate with passenger car use.

Cumulative Effects

There would be a reduction in presently used routes in all 7th field watersheds affected by addition of authorized routes in this alternative, and no adverse effects from runoff yield and timing would be expected. Detectable and positive trends in runoff would be expected in 11 of the watersheds from reduction in route density (Table 21). Addition of routes to the NFTS, and vehicle class changes are minor in these watersheds, and would not alter positive trends.

A list of ongoing and foreseeable road-related activities is presented in appendix B. These activities are all addition of current unauthorized roads to the NFTS or decommission of current system roads. These activities will add or subtract to total route density in 14 analyzed watersheds. Significant impacts from decreases in route density are indicated for 6 watersheds, as shown in Table 22.

Alternative 5 – Maximize Motorized Recreation Opportunities

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

There would be a general prohibition on cross-country travel on the forest. Vehicle use of 368 miles of identified unauthorized roads and trails across the forest would be discontinued. Cross-country travel would be prohibited on 508,000 acres that is currently available for this use. Short term benefits are reductions of fine sediments from running surfaces with direct surface drainage into streams. There are 88 miles in this category forest-wide. In alternative 5 about 26 miles of added routes would be in hydrologically sensitive areas, a reduction of about 77 percent from the current situation.

In the long term, some or all unauthorized routes and areas would probably revegetate and de-compact regaining some or most of their hydrologic and geomorphic functions, although use of these routes by non-motor vehicle traffic could delay or prevent recovery.

Direct and indirect effects of adding facilities to the NFTS:

This alternative would add 76 miles of roads and motorized trails to the NFTS in 35 7th field watersheds. Of these, 3.7 miles were field reviewed in the Upper and Middle Humbug watersheds and 0.48 miles found to have evident surface erosion on running surfaces or about 13 percent of miles reviewed, 1.2 miles were within riparian reserves.

These added routes would not recover as other unauthorized routes under the cross-country travel ban. These routes would continue to intercept and concentrate precipitation and groundwater flow into surface runoff contributing to erosion and sediment delivery to streams, and augmenting peak flows. The effects might be significant, and detectable, if the additional routes were to contribute to a total route density beyond about 3 miles per square mile (Grant et al, 2008). In this alternative, added routes would push the density of 1 7th field watersheds very close or significantly beyond this threshold (Upper Humbug). Additional routes in this watershed would be in excess of 40 percent of the NFTS total. Upper Humbug would have a total of 4.57 miles per square mile. Other watersheds (8 in total) also would have

existing density greater than 3 miles per square mile, but the alternative would not contribute substantially, more than 10 percent to the total.

Upper Humbug Creek 7th field watershed would have approximately 41 percent additional, authorized, routes in the NFTS (17 miles added for a total 57 in the watershed) in alternative 5. Many of these routes are motorized trails on ridge tops, so the degree of effects is uncertain, but the magnitude would probably exert a detectable change in hydrologic response; as augmented peak flow amount and advanced timing or duration.

Fifty-three acres of OHV use area (48 acres at Juniper Flat and 5 acres in the Humbug Creek area) would be available for use. These two areas are roughly equivalent to 13.3 miles of road surface. Effects would be the same as described for these two areas under alternative 2.

Direct and indirect effects of changes to existing NFTS:

There are no effects to water quality from changing vehicle class on existing roads, as no significant increase in traffic volume is anticipated. Road surfaces are mostly hardened on these routes (paved or graveled) and maintenance level appropriate with passenger car use.

Cumulative Effects

Of the 7th field watersheds that have proposed additions in NFTS, detectable and positive hydrologic effects would be expected in 24 HUC 7th field watersheds because of a reduction in route density. All watersheds affected by the alternative would have a reduction in route density, so no increases in runoff yield and timing would be expected. Addition of routes to the NFTS, and vehicle class changes would not alter positive changes.

A list of ongoing and foreseeable road-related activities is presented in appendix B. These activities are all addition of current unauthorized roads to the NFTS or decommissioning of current system roads. These activities will add or subtract to total route density in 14 analyzed watersheds. Net results indicate significant impacts from decreases in route density in 6 watersheds, as shown in Table 22.

Alternative 6 – Refined Proposed Action

Direct and indirect effects of prohibition of cross-country motor vehicle travel:

There would be a general prohibition on cross-country travel on the forest. Vehicle use on 378 miles of identified unauthorized roads and trails across the forest would be discontinued. Cross-country travel would be prohibited on 508,000 acres that is currently open on Forest land. Short term benefits are reductions of fine sediments from running surfaces with direct surface drainage into streams. There are about 90 miles in this category forest wide. In this alternative about 24 miles of added routes would be in hydrologically sensitive areas, a reduction of about 79 percent.

In the long term, some or all unauthorized routes and areas would probably revegetate and de-compact regaining some or most of their hydrologic and geomorphic functions, although use of these routes by non-motor vehicle traffic could delay or prevent recovery.

Direct and indirect effects of adding facilities to the NFTS:

This alternative would add 66 miles of roads and motorized trails to the NFTS in 36 7th field watersheds. Of these, 3.6 miles in Middle Fork Humbug and Upper Humbug watersheds were field reviewed (38 percent of total) and 2.5 miles were found to have surface erosion on running surfaces; 1.2 miles were within riparian reserves (project file: Hydro-report Nov 2008 update.doc).

These added routes would not recover as other unauthorized routes under the cross-country travel ban. These routes would continue to intercept and concentrate precipitation and groundwater flow into surface runoff contributing to erosion and sediment delivery to streams, and augmenting peak flows. The effects might be significant, and detectable, if the additional routes were to contribute to a total route density beyond about 3 miles per square mile (Grant et al, 2008). In this alternative, added routes would push the density of 1 7th field watersheds very close or significantly beyond this threshold (Upper Humbug). Additional routes in this watershed would be in excess of 30 percent of the NFTS total. Upper Humbug would have a total of 4.38 miles per square mile. Other watersheds (8 in total) also would have existing density greater than 3 miles per square mile, but the alternative would not contribute substantially, more than 10 percent to the total.

Upper Humbug Creek 7th field watershed would have approximately 35 percent additional, authorized, routes in the NFTS (15 miles added for a total 55 in the watershed) in alternative 6. Many of these routes are motorized trails on ridge tops, so the degree of effects is uncertain, but the magnitude would probably exert a detectable change in hydrologic response; as augmented peak flow amount and advanced timing or duration.

Fifty-three acres of OHV use area (48 acres at Juniper Flat and 5 acres in the Humbug Creek area) would be available for use. These two areas are roughly equivalent to 13.3 miles of road surface. Effects would be the same as described for these two areas under alternative 2.

Direct and indirect effects of changes to existing NFTS:

There are no effects to water quality from changing vehicle class on existing roads, as no significant increase in traffic volume is anticipated. Road surfaces are mostly hardened on these routes (paved or graveled) and maintenance level appropriate with passenger car use.

Cumulative Effects

Of the watersheds with proposed route additions, detectable and positive hydrologic trends for peak flow runoff yield and timing would be expected in 24 HUC 7th field watersheds (Table 21). All watersheds

would have a reduction in route density; therefore there would also be no expected increases in peak flow runoff or advance of peak flow timing in any watershed. Addition of routes to the NFTS, and vehicle class changes would not alter positive changes.

A list of ongoing and foreseeable road-related activities is presented in appendix B. These activities are all addition of current unauthorized roads to the NFTS or decommission of current system roads. These activities will add or subtract to total route density in 14 analyzed watersheds. Net results shown indicate significant impacts from decreases in route density in 6 watersheds, as shown in Table 22.

Table 21. Changes in route density (miles of route/square mile), for watersheds with proposed additions to NFTS. Values in *italics* denote values identical to alternative 3 and indicate no addition to routes in the watershed for that alternative.

HUC 7th Watershed	Current Route Density (Alt. 1)	Alternatives Route Density Change (%)				
		2	3	4	5	6
Antelope Sink	3.48	-44.26	**-46.64**	***-46.64***	-40.82	-40.82
Antelope Well	3.00	-3.63	**-34.79**	-34.63	-34.24	-34.24
Beaver/Grouse C.	7.15	-1.53	**-4.33**	***-4.33***	-1.53	-1.53
Bray/Butte C.	2.79	-10.11	**-19.90**	***-19.90***	-15.52	-15.52
Buckhorn C.	4.80	-6.43	**-8.49**	***-8.49***	-7.66	-7.66
Callahan Lava Flow	2.73	-14.30	**-15.47**	***-15.47***	-14.30	-14.30
Clear C,	2.63	-30.03	**-46.49**	***-46.49***	-45.26	-45.26
Crapo C.	1.15	-0.31	**-1.44**	0.00	0.00	0.00
Davis Gulch	2.33	-3.13	**-4.43**	***-4.43***	***-4.43***	***-4.43***
Dock Well	3.59	-12.94	**-14.89**	-14.31	-14.31	-14.31
Garner Mtn.	3.85	-22.14	**-26.70**	***-26.70***	-25.82	-26.33
Grass Lake NE	3.09	-9.75	**-10.72**	***-10.72***	***-10.72***	***-10.72***
Grouse Hill	3.34	-10.72	**-12.23**	-10.72	-10.72	-10.72
Haight Mtn.	4.20	-1.74	**-6.25**	-2.96	-2.96	-2.96
Hill 22	3.40	-12.08	**-25.77**	-15.67	-15.67	-19.94
Kanaka/Olsen	2.16	0.00	**-22.69**	0.00	0.00	0.00
Little. Humbug C.	3.57	-29.71	**-29.99**	-27.38	-27.38	-29.71
Long John C.	4.66	0.00	**-6.17**	0.00	0.00	0.00
Long Prairie	1.77	-37.39	**-40.02**	-37.39	-37.39	-37.39
Lower. First C.	4.92	-42.24	**-49.75**	***-49.75***	***-49.75***	***-49.75***
Lower Humbug C.	2.60	***-23.66***	**-23.66**	-22.30	-22.30	-23.66
Main Horsethief C.	3.08	-7.38	**-8.05**	-7.86	-7.86	-7.86
Meiss Lake	2.17	-11.99	**-14.04**	-13.24	-13.24	-13.24
M.F. Humbug C.	4.60	-32.29	**-48.22**	-38.62	-38.62	-38.62
Mud Lake	3.42	-5.69	**-8.40**	-7.07	-7.07	-7.07
Pollic Flat	3.09	-11.22	**-13.40**	-11.22	-11.22	-11.76

HUC 7th Watershed	Current Route Density (Alt. 1)	Alternatives Route Density Change (%)				
		2	3	4	5	6
Prather C.	2.46	-9.92	**-10.72**	-9.92	-9.92	-9.92
Round Valley	2.84	-17.99	**-20.42**	-18.33	-18.33	-19.07
Shafter/Butte C.	2.42	-38.06	**-42.81**	-41.53	-41.53	-41.53
Sharp Mtn.	2.78	-24.69	**-39.30**	***-39.30***	***-39.30***	***-39.30***
Tamarack Flat	3.16	-23.89	**31.85**	-29.39	-29.39	-29.39
Tecnor	2.43	-13.27	**-15.71**	***-15.71***	***-15.71***	-14.96
Tennant/Antelope C	4.31	-12.60	**-18.04**	-17.12	-17.12	-17.46
Trapper C.	3.88	-6.25	**-7.28**	-6.25	-6.25	-6.25
Up. First C.	4.96	-11.75	**-12.87**	***-12.87***	-12.76	-12.76
Up. Humbug C.	6.07	-29.55	**-46.77**	***-46.77***	-24.69	-27.89
Up. Shovel C.	3.57	-19.12	**-19.74**	***-19.74***	***-19.74***	***-19.74***
Van Bremmer Well	4.62	-35.14	**-40.01**	***-40.01***	-35.32	-35.32
Vesa C.	1.75	-28.98	**-33.31**	***-33.31***	-28.98	-28.98
W. Red Rock Valley	1.74	-1.98	**-7.69**	***-7.69***	-1.98	-1.98
Whaleback W. Slope	2.72	-10.86	**-11.37**	-10.96	-10.86	-10.86

Table 22. Changes in route density for analysis watersheds that have foreseeable road actions.

HUC 7th Watershed	Future Additions to NFTS (miles)	Future Decommissions to NFTS (miles)	Density Change (%) by Alternative implemented				
			2	3	4	5	6
Antelope Sink	7.04	0	-31.35	-33.43	-33.43	-27.61	-27.61
Antelope Well	0.4	0	-1.94	-33.10	-32.94	-32.55	-32.55
Buckhorn C.	0.22	1.13	-7.76	-9.82	-9.82	-8.99	-8.99
Crapo C.	0	3.09	-15.84	-16.97	-15.53	-15.53	-15.53
Davis Gulch	0	1.2	-6.26	-7.56	-7.56	-7.56	-7.56
Garner Mountain	0.33	0	-21.68	-26.24	-26.24	-25.36	-25.36
Pollic C.	2.05	0	-7.64	-9.82	-7.64	-7.64	-7.64
Prather C.	1.02	0	-7.12	-7.92	-7.12	-7.12	-7.12
Round Valley	3.78	0	-8.55	-10.98	-8.89	-8.89	-9.63
Shaffer-Butte C.	0.27	0	-37.43	-42.18	-40.90	-40.90	-40.90
Tennant-Antelope C.	2.84	0	-7.44	-12.88	-11.96	-11.96	-12.30
Upper first C.	0.27	0	-11.26	-12.38	-12.38	-12.27	-12.27
Van Bremmer Well	4.98	0	-26.92	-31.79	-31.79	-27.10	-27.10

Summary of Effects Analysis across All Alternatives

Each of the action alternatives should significantly reduce the overall effects of off highway use and established unauthorized routes due to the prohibition on cross-country travel. Alternative 3 is simply a prohibition on cross-country travel with no additions to the NFTS or vehicle class change on existing routes. It has the greatest positive effect for water resources by disallowing travel on at least 510 miles of unauthorized roads and trails.

Differences between action alternatives, 2, 5 and 6 are slight. Alternative 4, however, proposes very few additional routes, and has impacts quite comparable to alternative 3.

Based on measurements of route miles added to the system, and the amount of these routes within hydrologically sensitive areas, the merits of the remaining alternatives with regards to water resources are, in order of affecting a positive trend in both the short and long term, alternatives 4, 6, 5, 2, and 1.

Compliance with the Forest Plan and Other Direction

Clean Water Act.

The Basin Plan for the Klamath River contains water quality objectives, implementation plans for meeting those objectives, and other policies of the State Water Quality Control Board and the Federal Government, which are applicable to fuel treatment projects.

Water quality objectives are outlined in the California North Coast Regional Water Quality Control Board's (NCRWQCB) Water Quality Control Plan for the North Coast Region, as Adopted by the NCRWQB on December 9, 1993, Including Amendments Through 2004 (North Coast Region Water Quality Control Board 2001) (Basin Plan). The primary purpose for maintaining water quality is to assure that the beneficial uses of water are not adversely affected.

For management actions on National Forest System Lands, the Forest Service Pacific Southwest Region (R5) entered into a 1981 management agency agreement with the NCWQCB and State of California requiring the Forest Service to institute a water quality management program to meet applicable water quality objectives and protect beneficial uses. Under the agreement, implementation of State-approved and Environmental Protection Agency (EPA)-certified best management practices (BMPs) is considered sufficient to protect water quality (see project file: Klamath Travel BMPs.doc).

Activities on the Klamath National Forest are monitored regularly to confirm implementation and effectiveness of BMPs. Annual BMPEP monitoring reports are located in the project files and on the internet at http://www.fs.fed.us/r5/klamath/projects/forestmanagement/index.shtml.

The Klamath Travel Management project complies with the Clean Water Act by not adversely affecting beneficial uses of streams. Overall effects of the action alternatives are in each case a decrease in potential erosion, and sediment delivered to forest streams (Table 21) per 7th field HUC. These

reductions in impacts include Beaver/Grouse, Buckhorn, Clear, Long John, Lower Humbug, Middle Fork Humbug, Upper Humbug and Vesa Creek; all tributary to the Klamath River, and Crapo and Kanaka/Olsen which are tributary to the Salmon River. Both the Klamath and Salmon Rivers are listed under section 303(d) of the CWA for impairment due to sediment. Listing under 303(d) within project watersheds include: Humbug and Kanaka Creeks, for heavy metals and sediment from abandoned mines.

Aquatic Conservation Strategy

The Forest Plan contains the components, objectives and standards and guidelines for the ACS as recommended by the ROD. Of the nine ACS objectives on pages 4-6 and 4-7 of the Forest Plan, the following are applicable to the proposed OHV project:

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

The project would allow for the improvement of road impacts to the watershed, by prohibiting travel on 77 percent or more of identified unauthorized roads and trails forest wide. Those roads and trails brought into the system would receive systematic maintenance.

Maintain and restore spatial and temporal connectivity between watersheds.

None of the alternatives change aquatic access between watersheds as there is not a significant change in flow nor are barriers created. Prohibiting cross country travel (off road use) may prevent some further impacts to spatial and temporal connectivity caused by unauthorized travel through wetted stream channels.

Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.

This project is consistent with riparian reserve guidelines, which prohibit and regulate activities in the riparian reserves that may prevent or retard attainment of the Aquatic Conservation Strategy. Water quality is expected to improve from pre-project conditions, both forest-wide and by individual watershed. Maintenance of water quality would be achieved by minimizing sediment delivery to stream courses through road improvement actions and prohibiting cross country travel.

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the regime include the timing, volume, rate and character of sediment input, storage, and transport.

With cross-country travel prohibited in general and specific effects on up to 510 miles of unauthorized roads, some improvement is expected forest-wide on the load of fine sediments reaching streams.

Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats, and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

In many 7th field watersheds reduction of route density may also result in detectable changes in peak flow timing and volume with concomitant reductions in sediment for reasons stated in the body of the report.

Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows.

Any changes in peak flow and timing would be most probably be to small peaks associated with early season (fall) storm events that are not typically of sufficient volume and duration to affect floodplains.

Maintain and restore the species composition and structural diversity of plant communities in riparian areas.

Species composition of plant communities in riparian areas would be maintained since construction of new roads is not proposed. Prohibiting cross country travel may prevent further impacts to plant communities.

Maintain and restore habitat to support well distributed populations of native plant and invertebrate riparian dependent species.

The action alternatives would not construct new roads and therefore, populations of native plant and invertebrate riparian dependent species would be protected in a state similar to the current condition.

3.9 Soil Resources

3.9.1 Introduction

The soil resource provides many essential functions for National Forest System (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.

3.9.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the project as it affects the soil resource includes:

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 1991) 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 forest planning.

Region 5 Soil Management Handbook Supplement. The Forest Service Region 5 Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1) establishes regional soil quality analysis standards. The Forest plan standards and guidelines for soil productivity closely follow regional 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 R5 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 R5 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. Utilization of the thresholds and indicators provides a consistent method to analyze, describe, and report on soil condition throughout the Region.

3.9.3 Effects Analysis Methodology

Assumptions specific to analysis

Indirect effects to the soil resource will continue after the cross-country closure is in place. A 30 year recovery for passive recovery is assumed based on observations of recovery of closed roads on the Forest (Laurent, 2009, personal communication).

Soil characteristics of texture, slope, and hydraulic conductivity are grouped by the Soil Resource Inventory (USDA Forest Service, 1990). The Inventory classifies Forest soils into Erosion Hazard Rating (EHR) categories, which are broad evaluations of a soil's susceptibility to erosion. For the purposes of this report a route in a soil type with an EHR of high and very high is not expected to recover passively in the long term (30 years) even if it is not further disturbed. Combinations of steep slopes, non-cohesiveness, and coarse texture (which promotes erosion, and also degrades water holding capacity for plants) add to higher EHR ratings and make recovery within the term problematic (Table 23). The EHR categories are low, moderate, high and very high. A classification of high or very high indicates that these soils, once de-vegetated, will not recover quickly.

Data Sources

- Route-specific data collected by Forest staff in the field. Fieldwork focused on the Humbug area due to the proposal for numerous motorized trails in an area of granitic soils and high EHRs.
- Route inventories collected in step 1 of travel management and associated tabular data sets
- GIS query of transportation layer, soil resource inventory layer, which includes attributes of ERH and parent geology.

3.9.4 Soil Resource Indicators:

- Miles of unauthorized routes displayed by miles in each of the R5 EHR ratings.
- Miles of roads and trails open for motor vehicle use displayed by miles in each of the R5 EHR ratings.
- Cumulative effects on soil productivity from cross country travel routes and NFTS.
- Cumulative effects on soil productivity in areas currently open to cross country travel that are expected to recover (in the given long term analysis time period) after a cross-country closure is implemented; EHR categories low to high.

- Cumulative effects on soil productivity in areas currently open to cross country travel that are not expected to recover passively (in the given long term analysis period) after a cross-country closure is implemented; EHR category very high.
- Cumulative effects on soil productivity from implementation of the particular travel system for each alternative.

3.9.5 Methodology by Action

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

Short-term timeframe: 1 year.

Long-term timeframe: 30 years, based on observation of recovery of routes in the Forest by resource staff (Laurent, 2009, personal communication).

Spatial boundary: Forest boundary.

Indicator(s): (1) Miles of unauthorized routes displayed by miles in each of the R5 EHR ratings; (2) Miles of roads and trails open for motor vehicle use displayed by miles in each of the R5 EHR.

Methodology: GIS analysis of (1) authorized routes open for motor vehicle use and (2) existing unauthorized routes compared to GIS layers displaying R5 EHR ratings.

Rationale: General guidelines in the National Soil Management Handbook and Region 5 Soil Management Handbook Supplement.

2. Direct/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: 30 years.

Spatial boundary: Forest.

Indicator(s): (1) Miles of unauthorized routes displayed by miles in each of the R5 EHR ratings; (2) Miles of roads and trails open for motor vehicle use displayed by miles in each of the R5 EHR ratings.

Methodology: GIS analysis to compare the location of the trails/roads in each alternative with the zones of varying erosion potential risk.

Rationale: Analysis guidelines in the National Soil Management Handbook and Region 5 Soil Management Handbook Supplement.

3. Changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

Short-term timeframe: 1 year.

Long-term timeframe: 30 years.

Spatial boundary: Forest.

Indicator(s): (1) Miles of unauthorized routes displayed by miles in each of the R5 EHR ratings; (2) Miles of roads and trails open for motor vehicle use displayed by miles in each of the R5 EHR ratings.

Methodology: GIS analysis to compare the location of the trails/roads in each alternative with the zones of varying erosion potential risk.

Rationale: Analysis guidelines in the National Soil Management Handbook and Region 5 Soil Management Handbook Supplement.

4. Cumulative Effects

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

Long-term timeframe: 30 years

Spatial boundary: Forest.

Indicator(s): (1) Cumulative effects on soil productivity from unauthorized use (no action); (2) Cumulative effects on soil productivity in unauthorized areas that are expected to recovery (in the given long term analysis time period) after a cross-country closure is implemented; (3) Cumulative effects on soil productivity in areas that are not expected to recover passively (in the given long term analysis period) after a cross-country closure 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.

Rationale: Analysis guidelines in the National Soil Management Handbook and Region 5 Soil Management Handbook Supplement.

3.9.6 Affected Environment/Environmental Consequences

Affected Environment

The soils on the Forest are variable due to differences in parent material, climate, topography, biology and age. Soils on the west side of the Forest where OHV use is concentrated have developed in colluvium and

residuum from granitic and metasedimentary rock. These soils are moderately deep to deep (24-60+ inches). Soils on the east side of the Forest have developed primarily from volcanic ash deposited over lava flows. Soils are generally moderately deep to very deep (24-60+ inches). Surface soil textures are gravelly coarse sandy loams overlying gravelly, cobbly or very cobbly sandy loam subsoil.

Parent rocks of concern are plutonic (granitics), ultramafics (peridotite and serpentinite) and CMS (Condrey Mountain Schist). Soils derived from granitics are mostly noncohesive and are easily eroded by rilling and gulling when runoff water is concentrated. These soil textures are primarily sandy loams with three to eight percent clay. The CMS soils are sandy loam to silt loam textures, noncohesive and easily eroded. Ultramafic soils have higher clay content than the others, which make them prone to deformation when wet. Other soil types, such as those formed from metasediments, are not considered as a concern due to greater soil cohesion and higher rock fragment content. Soil types formed from volcanic ash are not considered as a concern due to a significant amount of road located on flat terrain and basically no off-road OHV trails.

Most of the Klamath National Forest is open to off-highway vehicle use. About 508,000 acres are lands less than 35 percent slope, and so are available to and usable by OHVs. Off-road vehicle use can result in soil displacement and compaction on any of these acres. Most use is currently concentrated on the 437 miles of user-created routes, which are compacted and mostly bare of vegetation.

Two heavily-used OHV areas (Juniper Flat and Humbug Creek) are both currently in a highly degraded state, largely un-vegetated. A high degree of soil compaction prevails in the Humbug Creek area, and rutting on slopes. Juniper Flat is on dry relatively non-cohesive soils. Wheel rutting is the prevalent disturbance.

Soil Erosion Hazard

Slope gradient, along with ground cover, are the most significant factors determining the potential for soil erosion. The west side of the Forest where most of the OHV use occurs has much steeper terrain than the east side, leading to more miles of routes with higher Erosion Hazard Ratings. About 20 percent of the Forest is classified with an EHR of very high, 45 percent as high, 28 percent as moderate, and 7 percent as low. Generally, an EHR of very high occurs on sandy soils derived from granitic bedrock on steep slopes. Of the 437 miles of user-created routes on the Forest, around 45 percent are in high or very high EHR categories (Table 23).

Table 23. Cumulative miles of unauthorized routes or routes proposed for designation in each EHR by alternative. All values are miles. Some miles do not have soil map coverage and therefore no assigned EHR.

Alternative	Erosion Hazard Rating				% No EHR Coverage	Totals
	Low	Moderate	High	Very High		
1 (No Action)	20.4	180.6	130.3	68.0	10	399.3
2	2.8	48.7	18.0	17.8	5	87.3
3	NA	NA	NA	NA	NA	NA
4	0.0	3.2	0.8	0.0	42	4.0
5	3.7	29.5	17.1	17.5	2	67.8
6	3.1	28.3	15.7	8.5	6	55.6

The soils most sensitive to water erosion are loose sandy and silty soils without ground cover. Erosion is greatest where runoff is concentrated and runoff dispersion features are lacking. Routes in the OHV areas are generally in good condition. Most erosion problems observed were on the steeper portions of roads. Roads that have been closed due to natural events showed very little erosion, due mainly to high levels of soil cover from needle cast. OHV trails on ridges have a high occurrence of rills and gullies. The intensity of rilling and gullying is dependent on the length of ridge without water dispersion features and frequency and season of use.

Environmental Consequences

Alternative 1 – No Action

Direct and indirect effects of the prohibition of cross-country travel

There would be no prohibition of cross-country travel on 1.2 million acres of National Forest System land of which 508,000 acres are suitable for OHV use. There are 437 miles of public-identified roads and trails that would continue to be available, and new routes could be created. These routes would continue in present condition or degrade. There is likely little or no improvement forestwide in road-related sedimentation or runoff that may cause off-site erosion. Under the current Forest Plan about 70 percent of the Forest is open to unrestricted OHV use.

A loss of productivity would occur in any new unauthorized routes through compaction, displacement or erosion and soil loss.

With continued OHV use, present conditions in the two unauthorized OHV use areas will persist in the short term; in the long term further degradation of the sites is likely through continued rutting and erosion of prominent trails.

Direct and indirect effects of adding new facilities to NFTS

Under this alternative there would be no additions to the NFTS.

Direct and indirect effects of changes to the existing NFTS

There would be no changes in vehicle class on any NFTS routes.

Cumulative Effects

At present there are 437 miles of public-identified unauthorized routes. With continued motorized use of these routes, there would be no significant change in the current condition in the foreseeable future.

Alternative 2 – Proposed Action

Direct and indirect effects of the prohibition of cross-country travel

There would be a prohibition on cross-country travel, which would potentially affect 345 miles of unauthorized public-identified roads and trails, and access to dispersed recreation sites. These routes would be left to passively or naturally recover through revegetation, and a gradual decompaction of remnant soil. In some cases, particularly on steeper slopes, soil loss may be mostly complete, and the process of recovery may depend on the extent of road cut sloughing or ravel from hill slope. Unauthorized routes in areas with high and very high EHR ratings would not be expected to stabilize or may take many decades to centuries to stabilize.

Direct and indirect effects of adding new facilities to NFTS

There would be 92 miles of roads and motorized trails added to the NFTS, 36 miles in high or very high EHR. Because the routes have already been impacted by use, the effect of adding them to the NFTS would be no change (to the soil resource) from the current condition in both the short and long term.

Sixty-five acres of OHV use area (60 acres at Juniper Flat and 5 acres at Humbug Creek area) would be available for use. These two areas are roughly equivalent to 16.5 miles of road surface. Currently both areas are in a highly degraded state, largely un-vegetated. A high degree of compaction prevails at Humbug Creek area, and rutting on slopes. The area mostly drains into a small basin with problematic connection to the stream and little potential for down slope movement of sediment. Juniper Flat is on dry relatively non-cohesive soils, much of the area is internally drained with little potential for sediment movement. Wheel rutting is the prevalent disturbance. At both sites in the short term it is likely that present conditions would persist, and in the long term that further degradation is likely due to rutting.

Direct and indirect effects of changes to the existing NFTS

There would be about 88 miles of mixed use allowed on existing NFTS routes. These routes are currently being used by a mix of highway and off-highway legal vehicles; the designation would formalize the use by OHVs. Mixed use on these routes will not affect soil resources.

Cumulative Effects

The 345 miles of identified unauthorized routes that would be closed to motorized use are nearly 79 percent of identified unauthorized routes on the Forest, and would represent a significant short term decrease in soil disturbance and degradation. About 82 percent of the routes that will be closed are in areas with high or very high EHR. This will be a benefit to the soil resource in the long term, although these areas are not expected to stabilize for 30 years or more. The routes and areas proposed for designation under this alternative already exist and are being used, so direct effects to the soil resource have already occurred. Erosion control measures, such as cross ditching or rolling dips will be installed to prevent further degradation of the facility surface and reduce effects to the soil resource downslope. These measures are expected to be effective in reducing erosion on the soil downslope from the travel facility surface. Ongoing and foreseeable road actions include the addition of 8 miles of ML 1 roads and 11 miles of ML 2 roads to the NFTS, and decommissioning of 16 miles of road.

Alternative 3 – Cross-country Motorized Travel Prohibition Only – No Changes to the Current NFTS

Direct and indirect effects of the prohibition of cross-country travel

Same comments as above under alternative 2.

There would be a prohibition of cross-country motorized travel affecting 437 miles of unauthorized public-identified roads and trails. There would be a significant short term decrease in sediment production, particularly of fine material < 0.4 mm in diameter from running surfaces. These routes would passively or naturally recover through revegetation, and a gradual decompaction of remnant soil. In some cases, mostly on steeper slopes, soil loss may be complete, and the process of recovery may depend on the extent of road cut sloughing, soil creep or ravel from the hill slope. This process could range from decades to centuries and may be roughly assessed by EHR category.

Direct and indirect effects of adding new facilities to NFTS

Under this alternative there would be no additions to the NFTS. The current condition would persist for at least the short term until or if there are changes in use.

Direct and indirect effects of changes to the existing NFTS

There would be no changes in vehicle class on any NFTS routes.

Cumulative Effects

There would be gradual and eventually significant change in the current condition in the long term. This alternative would eliminate use on 198 miles of routes in soil types with high or very high EHR values. This will result in beneficial effects on soil resources in the long term; however, some of these routes may take longer than 30 years to recover. Ongoing and foreseeable road actions include the addition of 8 miles

of ML 1 roads and 11 miles of ML 2 roads to the NFTS, and decommissioning of 16 miles of road. These road actions have or will have soil analyses that will ensure they meet the Regional Soil Quality Standards through application of project design standards or mitigation measures. Effects on soils from these projects are expected to be minimal.

Alternative 4 – Maximize Quiet Recreation Opportunities

Same comments as above under alternative 2.

Direct and indirect effects of the prohibition of cross-country travel

There would be a prohibition on cross-country motorized travel affecting 494 miles of unauthorized public-identified roads and trails, and dispersed recreation site access. These routes represent almost 8.4 percent of all routes currently on the forest. Within a few years, through recovery of ground cover on many of the routes by litter fall and revegetation, sediment production would not be much over base level.

Direct and indirect effects of adding new routes to NFTS

There would be 92 miles of roads and motorized trails added routes to the NFTS, 36 miles in high or very high EHR. Because the routes have already been impacted by use, the effect of adding them to the NFTS would be no change from the current condition in both the short and long term.

Direct and indirect effects of changes to the existing NFTS

There would be about 102 miles of mixed use allowed on existing NFTS routes. These routes are currently being used by a mix of highway and off-highway legal vehicles; the designation would formalize the use by OHVs. Mixed use on these routes will not affect soil resources.

Cumulative Effects

The 430 miles of identified unauthorized routes that would be closed to motorized use is 98 percent of identified unauthorized routes on the Forest, and represents a significant short term decrease in sediment production of fine material (<0.4mm diameter). All but 0.8 mile of the routes in high or very high EHR will be closed to motorized use, which will be a beneficial impact to soil condition in the long term. Some of these routes, and the two OHV use areas, may take much longer to recover than 30 years. The 7 miles of routes proposed for designation under this alternative already exist and are being used. There will be no change from the current situation for these routes. Ongoing and foreseeable road actions include the addition of 8 miles of ML 1 roads and 11 miles of ML 2 roads to the NFTS, and decommissioning of 16 miles of road. These road actions have or will have soil analyses that will ensure they meet the Regional Soil Quality Standards through application of project design standards or mitigation measures. Effects on soils from these projects are expected to be minimal.

Alternative 5 – Maximize Motorized Recreation Opportunities

Direct and indirect effects of the prohibition of cross-country travel

There would be a prohibition on cross-country motorized travel, specifically 428 miles of unauthorized public-identified roads and trails, and dispersed recreation site access. These routes are about 7.3 percent of all current routes, NFTS and unauthorized, on the forest and would result in significant short term reductions in fine sediment production and delivery and transport to and by streams.

Direct and indirect effects of adding new facilities to NFTS

There would be 69 miles of roads and motorized trails added routes to the NFTS, 36 miles in high or very high EHR. Because the routes have already been impacted by use, the effect of adding them to the NFTS would be no change from the current condition in both the short and long term.

Fifty-three acres of OHV use area (48 acres at Juniper Flat and 5 acres at Humbug Creek area) would remain open to cross-country motorized travel. These two areas are roughly equivalent to 13.3 miles of road surface. With continued OHV use, present conditions will persist in the short term; and in the long term further degradation is likely.

Direct and indirect effects of changes to the existing NFTS

There would be about 278 miles of mixed use allowed on existing NFTS routes. These routes are currently being used by a mix of highway and off-highway legal vehicles; the designation would formalize the use by OHVs. Mixed use on these routes will not affect soil resources.

Cumulative Effects:

The 378 miles of identified unauthorized routes that would be closed to motorized use is 86 percent of identified unauthorized routes on the Forest, and represents a significant short term decrease in sediment production of fine material (<0.4mm diameter). About 82 percent of the routes in high or very high EHR will be closed to motorized use, which will be a beneficial impact to soil condition in the long term. Some of these routes may take much longer to recover than 30 years. The routes and areas proposed for designation under this alternative already exist and are being used. There will be no change from the current situation. Ongoing and foreseeable road actions include the addition of 8 miles of ML 1 roads and 11 miles of ML 2 roads to the NFTS, and decommissioning of 16 miles of road. These road actions have or will have soil analyses that will ensure they meet the Regional Soil Quality Standards through application of project design standards or mitigation measures. Effects on soils from these projects are expected to be minimal.

Alternative 6 – Refined Proposed Action

Direct and indirect effects of the prohibition of cross-country travel

There would be a prohibition on cross-country motorized travel, specifically on 431 miles of unauthorized public-identified roads and trails, and dispersed recreation site access. These routes are about 7 percent of all current routes, NFTS and unauthorized on the forest and would result in significant short term reductions in fine sediment production and delivery and transport to and by streams.

Direct and indirect effects of adding new facilities to NFTS

There would be 59 miles of roads and motorized trails added routes to the NFTS, 36 miles in high or very high EHR. Because the routes have already been impacted by use, the effect of adding them to the NFTS would be no change from the current condition in both the short and long term.

Fifty-three acres of OHV use area (48 acres at Juniper Flat and 5 acres at Humbug Creek area) would remain open to cross-country motorized travel. These two areas are roughly equivalent to 13.3 miles of road surface. With continued OHV use, present conditions will persist in the short term; and in the long term further degradation is likely.

Direct and indirect effects of changes to the existing NFTS

There would be about 92 miles of mixed use allowed on existing NFTS routes. These routes are currently being used by a mix of highway and off-highway legal vehicles; the designation would formalize the use by OHVs. Mixed use on these routes will not affect soil resources.

Cumulative Effects

The 368 miles of identified unauthorized routes that would be closed to motorized use is 84 percent of identified unauthorized routes on the Forest, and represents a significant short term decrease in sediment production of fine material (<0.4mm diameter). About 82 percent of the routes in high or very high EHR will be closed to motorized use, which will be a beneficial impact to soil condition in the long term. Some of these routes may take much longer to recover than 30 years. The routes and areas proposed for designation under this alternative already exist and are being used. There will be no change from the current situation. Ongoing and foreseeable road actions include the addition of 8 miles of ML 1 roads and 11 miles of ML 2 roads to the NFTS, and decommissioning of 16 miles of road. These road actions have or will have soil analyses that will ensure they meet the Regional Soil Quality Standards through application of project design standards or mitigation measures. Effects on soils from these projects are expected to be minimal.

Summary of Effects Analysis across All Alternatives

Each of the action alternatives should reduce the overall effects to the soil resource due to the prohibition on cross-country travel. Alternative 3 is simply a prohibition on cross-country travel with no additions to

the NFTS or vehicle class change on existing routes. It has the greatest positive effect for the soil resource by disallowing travel on all existing 437 miles of unauthorized roads and trails across the forest. The cross-country travel prohibition will result will stop the proliferation of soil displacement and compaction from vehicle use.

Based on measurements of route miles added to the NFTS, and the amount of these routes within high or very high EHR evaluation, the merits of the remaining alternatives with regards to soil resources are, in order of affecting a positive trend in both the short and long term, alternatives 4, 6, 5, 2, and 1.

Differences between action alternatives, 2, 5 and 6 are relatively slight. Alternative 4, however, proposes very few additional routes, and has impacts very comparable to alternative 3.

Compliance with the Forest Plan and Other Direction

Forest standards largely comply with regional standards (USDA Forest Service, 1995). By definition NFTS roads and trails and other areas not dedicated to growing vegetation are not considered activity areas to which the standards should be applied. Therefore any route or area already within the NFTS or brought into the NFTS by any alternative considered in this plan is not subject to standards of soil productivity. Nevertheless substantial gains will be realized in the long term by any action alternative presented in this plan through the closure of existing unauthorized routes and/or the prohibition of cross-country travel in the forest. These actions comply with NFMA (1976) in that they recognize and demonstrate a fundamental need to protect and improve soil and water condition.

3.10 Fisheries

3.10.1 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 National Forest System (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 LRMP. Management decisions related to motor vehicle travel can affect aquatic species by increasing human-caused mortality, causing changes in behavior due to disturbance, and habitat modification (Gaines et al. 2003, Trombulek and Frissell 2000, USDA Forest Service 2000). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife, and avoid significant disruption of wildlife habitat while providing for public motor vehicle use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to motor vehicle travel on NFS lands must consider effects to fish and their habitat. For purposes of this discussion, the term “fish” is used to include species as well as habitat, unless specifically addressed otherwise (e.g., MIS habitat).

3.10.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action as it affects aquatic 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 species (TES), 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 TES species under their jurisdiction. It is forest service policy to analyze impacts to TES species to ensure management activities are not likely to jeopardize the continued existence of a TES 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/BE) 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 FSS species to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in the KNF Motorized Travel Management EIS Fisheries Biological Assessment Biological Assessment (BA/BE) and is summarized or referenced in this chapter.

Species specific standards and guidelines are identified below under species effects analysis.

KNF Land and Resource Management Plan (LRMP)

The 1994 LRMP identified the following management prescriptions for riparian reserves and key watersheds that will be considered during the analysis process. Pg 4-110, 112, 113 standards and guidelines:

Recreation Management

MA10-22 New recreational facilities within RRs, including trails and dispersed sites, should be designed to not prevent meeting Aquatic Conservation Strategy objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within RRs, evaluate and mitigate impact to ensure that these do not prevent and, to the extent practicable, contribute to attainment of Aquatic Conservation Strategy objectives.

Transportation and Facilities Management

MA10-45 Minimize sediment delivery to streams from roads. Road design measures may include minimum impact location, appropriate road surfacing, armoring of ditch-lines, controlled compaction of fills, outsloping of roads, mechanical and vegetative slope protection, wet weather traffic control, annual maintenance and inspection. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.

MA10-46 Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams. Construct stream crossings to not divert streamflow out of the channel and down the road alignment.

Vegetation Management

MA10-55 Maintain or restore riparian vegetation to provide summer and winter thermal regulation within the riparian area.

3.10.3 Effects Analysis Methodology

Introduction

Riparian reserves have been selected as a key area of consideration for assessing potential effects to fish. Riparian reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Standards and guidelines prohibit and regulate activities in riparian reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Riparian reserves are important because they include the habitat fish need and utilize in whole or in part. Riparian reserves land allocation widths and standards and guidelines in accordance with the Aquatic Conservation Strategy Objectives can be found in the KNF Land and Resource Management Plan (1994).

Assumptions specific to fisheries resource analysis

1) All vehicle types result in the same amount of disturbance effect on aquatic dependent species.
2) Aquatic species spend all or significant portions of their life cycles either in or moving through riparian habitats.
3) Habitat is already impacted in the short-term. In the long-term, habitat will increase to some degree due to passive restoration in areas where cross-country travel is prohibited and unauthorized routes are not added to the NFTS (see Soils section for further assumptions).
4) Human-caused disturbances near small streams can disrupt natural biological processes and have the potential to adversely affect biological characteristics and fragment habitats.
5) Sediment from roads can result in adverse effects to fisheries habitat if it enters the aquatic environment.
6) Unpaved roads located near or with crossings on small streams can result in adverse affects to fish habitat.
7) The overall effect of roads to fish habitat is related to the amount of sediment movement from road surfaces, and is highly variable within and among surface types. It is related to levels of maintenance, road drainage, and type of use of the road.
8) The reduction or elimination of vehicle traffic on a road near a stream will result in less sediment delivered from the road to the stream.
9) The elimination of vehicle traffic on a road near a stream during periods of wet road conditions will result in less sediment being delivered from the road to the stream. Vehicle use on wet roads has the potential to cause ruts and damage to the roads with a resultant increase in erosion of sediment from the road during rainfall events and periods of snowmelt.
10) The density of roads and trails at the watershed scale will not be substantially changed as a result of any of the action alternatives for at least the next 20 years because all of the action alternatives involve the prohibition of cross-country travel and vehicle use by the public rather than the physical

removal of roads. Routes not added to the NFTS under alternatives 2 through 5 would slowly re-vegetate and regain the conditions that exist on adjacent lands. The low levels of public nonmotorized use, permitted use, or administrative use would be insufficient to overcome the natural in-growth of vegetation and accumulation of organic material into the unauthorized routes.

11) Routes without hydrologic connectivity to streams will not influence sedimentation rates and will have **no effect** on that water quality parameter affecting aquatic species.
12) Routes in riparian areas can cause vegetative disturbances that result in decreased stream shading, increases in solar loading, and possible changes in stream temperatures.
13) Routes outside of riparian reserves will not influence the aquatic environment, or have negative impacts on fish or their habitat.

3.10.4 Data Sources

1. GIS layers of the following information: routes; habitats; and 'designated' or important aquatic areas.
2. Site-specific surveys/assessment of any localized sensitive aquatic habitats with routes proposed to be added to the NFTS (e.g., wet meadows, stream crossings, riparian corridors).

3.10.5 Fisheries Resource Indicators

These indicators were used for all activities.

1. Miles of unauthorized routes (alternatives 1 and 3) or roads/motorized trails proposed for addition to the NFTS within or adjacent to fisheries resources (alternatives 2, 4, 5 and 6).
2. Acres of riparian reserves affected by an unauthorized route/proposed road/trail
3. Miles of routes open for motor vehicle use within known or historically occupied habitats of threatened, endangered or sensitive fish species.

3.10.6 Fisheries Resource Methodology by Action

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

   Short-term timeframe: 1 year.

   Long-term timeframe: 20 years.

   Spatial boundary: Forest or watershed

   Indicators: All three indicators were used.

   Methodology: GIS analysis of added routes in relation to habitat and important/sensitive aquatic areas. Riparian reserves and buffers were assumed to be 170' on either side of the stream (340' or two site tree heights).

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, Trombulek and Frissell 2000, USDA Forest Service 2000).

2. Direct/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: Forest or watershed

   Indicators: All three indicators were used.

   Methodology: GIS analysis of added routes in relation to habitat and important/sensitive aquatic areas.

   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, Trombulek and Frissell 2000, USDA Forest Service 2000).

3. Changes to the existing NFTS.

   Same as 2 above.

4. 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: Forest.

   Indicators: All three indicators were used.

   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 aquatic habitat.

   Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance, and habitat modification (Trombulek and Frissell 2000, USDA Forest Service 2000).

3.10.7 Affected Environment/Environmental Consequences

Affected Environment

The Klamath National Forest covers an area of 1,700,000 acres located in Siskiyou County, Northern California and Jackson County, Oregon. The analysis area for fisheries habitat includes twelve 7th-field watersheds that contain anadromous species or their habitat. The six 7th-field watersheds that have habitat located adjacent to or immediately downstream of existing non-system roads and/or trails proposed to be added to the NFTS are:

Upper Humbug Creek

Middle Fork Humbug Creek

Lower Humbug Creek

Ash Creek

Badger-Klamath River

Deer-Beaver

Four 7th-field watersheds have anadromous habitat located at distances ranging from 0.75 to 4.0 miles downstream from existing non-system roads and/or trails proposed to be added on to the FS system:

Little Humbug Creek: 0.75 miles of anadromous habitat

Quigleys-Klamath River: 1.50 miles of habitat

Buckhorn Creek: 0.75 miles of habitat

Doggett Creek: 4.0 miles of habitat

Some access routes to camping sites are proposed for designation as roads in Long John Creek and Beaver-Grouse Creek 7th-field watersheds; these routes are very short and are located high in the watershed. Several are in intermittent stream channels.

All twelve 7th-field watersheds exhibit varying amounts of checkerboard ownership, with interspersed federal and private land. Past disturbances include wildfire, timber harvest (with associated roads), mining, and grazing (these are all reflected in the current condition descriptions). Most stream channels in the project area are stable or in the process of stabilizing.

Specific conditions for each 7th-field watershed are listed below:

Upper Humbug Creek: This watershed has a high level of disturbance, including road densities of 3.17 miles per square mile. Embeddedness is high with the average being about 48 percent. This is above the maximum desired level of 20 percent as defined in the Forest Plan. The high levels of embeddedness are likely due to the large amounts of silt and sand present in the upper portions of this watershed. The mainstem channel banks are generally stable and well vegetated. The riparian reserves are considered properly functioning on federal land in this watershed, and at risk on private land. Stream temperature

surveys in 2004 showed that stream temperatures averaged 16.0 °C, which is considered properly functioning.

Middle Fork Humbug Creek: This watershed has a moderate level of disturbance, including road densities of 2.34 miles per square mile. Embeddedness is moderate with the average being about 27 percent. This is above the maximum desired level of 20 percent as defined in the Forest Plan. The mainstem channel banks are generally stable and well vegetated. The riparian reserves are considered properly functioning on federal land within watershed and at risk on private land. Stream temperature surveys in 2004 showed that stream temperatures averaged 16.9 °C, which is considered properly functioning.

Lower Humbug Creek: This watershed has a moderate level of disturbance, including road densities of 2.05 miles per square mile. Embeddedness is moderate with the average being about 32 percent. This is above the maximum desired level of 20 percent as defined in the Forest Plan. The moderate levels of embeddedness are likely due to the large amounts of silt and sand present in the upper portions of this watershed. The mainstem channel banks are generally stable and well vegetated. The riparian reserves are considered properly functioning on federal land in this watershed and at risk on private land. Stream temperature surveys in 2004 showed that stream temperatures averaged 17.9 °C, which is considered properly functioning.

Quigleys-Klamath River: This watershed has a low level of disturbance, including road densities of 2.96 miles per square mile. Embeddedness is moderate with the average being about 20 percent. This is at the maximum desired level of 20 percent as defined in the Forest Plan. The moderate levels of embeddedness are likely due to the large amounts of silt and decomposed granitics present in the upper portions of this watershed. The mainstem channel banks are generally stable and well vegetated. The riparian reserves are considered at risk. Stream temperature surveys in 1994 showed that stream temperatures averaged 20.9 °C, which is considered at risk.

Badger-Klamath River: This watershed has a low level of disturbance, including road densities of 1.39 miles per square mile. Embeddedness is low with the average being about 18 percent. This is below the maximum desired level of 20 percent as defined in the Forest Plan. The mainstem channel banks are generally stable moderately vegetated. The riparian reserves are considered at risk. Stream temperature surveys in 1994 showed that stream temperatures averaged 24.5 °C, which is considered not properly functioning.

Ash Creek: This watershed has a low level of disturbance, including road densities of 1.79 miles per square mile. The mainstem channel banks are generally stable and moderately vegetated. The riparian reserves are considered at risk. Stream temperature surveys in 1994 showed that stream temperatures averaged 24.0 °C, which is considered not properly functioning.

Little Humbug Creek: This watershed has a moderate level of disturbance, including road densities of 3.24 miles per square mile. The riparian reserves are considered at risk. No stream temperature data or stream survey data is available.

Buckhorn Creek: The reaches vary in stability due to some unstable slopes adjacent to the channel. There are less fines in tributaries further upstream, reflecting a smaller number of upstream road crossings higher in the drainage, however fine sediment is still evident. A 2002 Forest Service stream condition inventory observed fines in pool tail outs to be 15 to 41 percent, with an average of 26 percent fines in the substrate. Embeddedness ranged from 15 to 70 percent, with an average of 38 percent. The road density is 3.62 miles per square mile. Riparian reserves are considered to be properly functioning on federal land in this watershed and at risk on private land.

Doggett Creek: Lower Doggett Creek appears to be a fairly resilient channel, showing good recovery in the five years since the 2000 Bark Fire. However, some of the tributaries burned hot enough to replace the conifer stands with shrubs and grasses. The main stem channel banks are generally stable and well vegetated and the bed is fairly stable with some minor downcutting below road crossings. The pools are mostly filled with particles that are predominantly gravel with some cobble. The riparian area above and below the 12 road crossing is a robust, multi-layered stand. The road density is 3.92 miles per square mile. Riparian reserves are considered to be properly functioning on federal land in this watershed and at risk on private land.

Deer-Beaver Creek: This watershed has a high level of disturbance, including road densities of 4.75 miles per square mile. Embeddedness is high with the average being over 50 percent. This is well above the maximum desired level of 20 percent as defined in the Forest Plan. The high levels of embeddedness are likely due to the large amounts of decomposed granitics present in the upper portions of this watershed. The mainstem channel banks are generally stable and well vegetated. The riparian reserves are well vegetated and are considered properly functioning. Stream temperatures are considered to be properly functioning due to the healthy condition of the riparian reserves.

Long John Creek: High levels of fines and embeddedness are present throughout this watershed. This is due mostly to the large amounts of decomposed granitics present in the upper elevations of the watershed and not so much due to the road density since the road density is moderate at 3.73 miles per square mile. The riparian reserves are considered properly functioning. The mainstem channel banks are stable with little downcutting present. Stream temperature surveys in 1994, 1999, and 2002 showed that stream temperatures in this watershed averaged 15 C and are properly functioning.

Beaver-Grouse Creek: This watershed is still recovering from the 1997 flood and from a debris flow that occurred during a summer thunderstorm in 1989. These events resulted in large amounts of sediment and decomposed granitics transported down the stream channel(s) from the upper elevations of the watershed. Therefore, embeddedness is high (average 50 percent) and not in equilibrium with the watersheds' ability to transport sediment through the system. In spite of these recent events, the stream

channel and banks are stable. Stream temperature surveys in 1999 and 2002 showed that stream temperatures averaged 17 °C and are properly functioning. Road density is 4.15 miles per square mile, indicating a moderate to high level of disturbance.

The upper portions of these watersheds generally have a low to moderate level of disturbance while the lower portions of these watersheds exhibit a high level of disturbance due to vegetation management activities conducted on large parcels of private lands. Stream temperatures and riparian reserves are considered to be At Risk in the lower elevations of several of these watersheds due to reduced amounts of riparian vegetation along the stream channel.

The fine silt and sand found in many of the lower stream reaches indicates that suspended sediment has been high in recent years. Some embeddedness is evident but it is not severe. The analysis area tributaries undergo a few days of turbidity after thunderstorms.

Some unauthorized routes in other watersheds are proposed for addition to the NFTS. No separate analysis was conducted for those watersheds because (1) the routes did not occur in riparian areas; (2) the routes did not affect fisheries resources (routes did not have any hydrologic connectivity to streams or were located outside the habitat or distribution of the fish species analyzed); or (3) the mileage (total route length) was so low that there is no way to conduct a meaningful analysis – effects would not be measurable against other background disturbances.

Unmanaged motorized vehicle use has resulted in unplanned roads and motorized trails in these watersheds. Approximately 437 miles of unauthorized routes have been identified on the KNF. All of these routes were reviewed by resource specialists who provided input regarding potential drainage and erosion problems. Many routes that raised resource concerns were eliminated from detailed study. Many of the publicly identified routes are considered to be self-maintaining (i.e., they will not require additional engineering design or reconstruction to drain properly). A few routes and an area open to cross-country travel situated in erodible soils in the Humbug area were included in most of the action alternatives due to the importance of this area to off-road enthusiasts. Some of these trails would require drainage work prior to designation as motorized trails.

Fisheries

The KNF provides habitat for many species of fish. There are currently three species of fish listed under the Endangered Species Act on the Forest, two species of fish on the 2007 Region 5 sensitive species list, and one management indicator species (MIS) (Table 24). There is no designated Critical Habitat for the two species of suckers on the KNF, and the Forest is outside their range; therefore, they will not be addressed further in this document. The listed species and their habitats on the KNF are described in detail in the KNF Motorized Travel Management EIS Fisheries Biological Assessment (BA/BE), which is hereby incorporated by reference and can be found in the project record. Rainbow trout are discussed in

the KNF Motorized Travel Management MIS Report, which is incorporated by reference and can be found in the project record.

Table 24. KNF threatened, sensitive, and management indicator species of fish

Common Name	Scientific Name	Status	Miles of user-created routes within known or historically-occupied habitat
Southern Oregon/Northern California Coasts (SONCC) Coho Salmon	*Oncorhynchus kisutch*	Federally Threatened	14.6
Upper Klamath-Trinity Rivers (UKT) Chinook salmon	*Oncorhynchus tshawytscha*	Forest Sensitive	10.4
Klamath Mountains Province (KMP) Steelhead trout	*Oncorhynchus mykiss*	Forest Sensitive	14.7
Rainbow Trout	*Oncorhynchus mykiss*	MIS	23.4
Shortnose Sucker	*Chasmistes brevirostris*	Federally Endangered	--
Lost River Sucker	*Catostomus luxatus*	Federally Endangered	--

Because of their proximity to streams, riparian areas are particularly vulnerable to the effects of motorized vehicle use. Sixty miles of user-created routes are located within riparian reserves.

Off-road motorized use can impact water quality through sedimentation, removal of vegetation, and contamination. These types of effects would be most likely to affect the four salmonid species if they occurred within known or occupied habitats. The miles of user-created routes that currently exist within known or historically occupied habitats are shown in Table 24.

Land Uses

The privately owned sections of the 7th-field watersheds are used mostly for timber harvest, while the privately owned lower sections of the 5th-field watersheds are used mostly for ranching and farming. Most of the 7th-field watersheds are in public ownership. The watersheds get a considerable amount of dispersed recreation, mainly sightseeing, camping, and off-highway vehicle use, with an increase in camping and hunting during late summer and fall. Most of the recreation-associated watershed effects are from off-highway vehicles causing localized road erosion. While most use is on roads, some off-road enthusiasts will drive on steep slopes or onto seasonal meadows, causing vegetation loss and soil compaction.

Beneficial uses

The primary purpose for maintaining water quality is to assure that the beneficial uses of water are not adversely affected. Beneficial uses include fish habitat, domestic water supply, and recreational

opportunities. The latter two uses are addressed in the hydrology section. Fish species, including those on the Forest Sensitive list, occur across much of the Forest.

Environmental Consequences

The following section serves as an overview of the potential risks or types of effects that can occur to fish from the actions proposed under each of the alternatives.

For this project, the primary impact to stream systems, and consequentially the species that inhabit them, is from sediment moving into the water from unsurfaced roads. Several 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, soils (erodibility), the steepness of slope below the road, and vehicle usage (Chin et al. 2004; Clinton and Vose 2003). Other factors that contribute to in-channel sediment delivery include the number of stream crossings on a channel, the condition of stream approach, and the road length draining into the stream channel crossing. Input may be limited in areas where road use is light; however, the orientation of the road, soil type, steepness, and length can all affect the amount of sediment that enters the stream during rain or snowmelt events. Chin et al. (2004) demonstrated that increased use of non-engineered routes can alter stream habitat by increasing sedimentation within the channel, effectively decreasing pool depths, decreasing interstitial spaces in substrate, and increasing turbidity. These factors lead to a decrease in habitat quality for macro-invertebrates and fish. Sediment in spawning gravel increased by 2.6 – 4.3 times in watersheds with more than 4.1 miles of road per square mile (Cedarholm et al. 1980).

Most surface water contaminants enter streams at stream crossings by roads, or places where other disturbances are close to streams (Gucinski et al. 2001). Gucinski also notes that trails for bicycling, walking or horseback riding erode at rates similar to roads, but the total sediment delivered from these trails is generally lower because the total surface area of a narrow trail is less than that of most roads. Road dust can transport unwanted chemicals to surface water. Emissions from OHVs, particularly those with 2-stroke engines, can include a variety of contaminants, which may settle directly in wetlands and streams, or may be deposited on snow or soils during rain events, from which they may be mobilized into wetlands and streams. Christensen et al. (1997) observed recent accumulations of polycyclic aromatic hydrocarbons in a Wisconsin stream, and identified dust from nearby roads as a source of the pollutant. Fine grain sediments from road crossings and dust particles from nearby roads can settle in a stream and lodge in interstitial spaces between larger substrate, filling in the areas inhabited by stream dwelling insects, and thereby reducing the available food for trout and other fish. The plugging of these spaces also inhibits the flow of water through the substrate, inhibiting the oxygenating and cleansing properties of flowing water that enables fish eggs and alevin to develop. This condition would reduce the amount of habitat available to fish for reproduction, and could reduce the amount of fish in the stream.

Roads that are within the riparian vegetation adjacent to streams and other aquatic features, or cross the streams, can directly affect the stream vegetation by removing, or inhibiting (repressing), riparian

plant growth. The effects of this action would be similar for all alternatives, but the intensity would be different depending on the extent of the impact for each alternative, related to the density of routes within a defined area. Impacts include loss of porosity of the soil, loss of water holding capability of the soil, reduction of habitat for terrestrial insects that fish eat, loss or reduction of shade into the stream habitat, and reduction in thermal buffering in the riparian area. Vegetation removal impacts are very localized.

Road maintenance and use can affect adjacent vegetation as well. Brushing for sight distance along road edges removes trees and shrubs, and traffic can compact soils along road edges that can affect plant growth and survival. While the road itself creates an edge effect, reductions in vegetation can alter plant community structure and result in increased solar radiation and wind effects. Increases in soil compaction, combined with increases in solar radiation, have the potential to increase soil temperatures and decrease soil moisture, thereby reducing habitat suitability for aquatic, aquatic-dependent, and riparian dependent species. Direct effects to aquatic species from roads and motorized vehicles include direct crushing from tires at stream crossings. Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance, and habitat modification (Moyle and Randall 1996; Trombulek and Frissell 2000; USDA Forest Service 2000). This action would be minimal as most fish would evade tires as they entered the water. Habitat that is accessible to cross-country travel could be susceptible to this type of impact, although the potential for this is low as many of the habitats associated with the fish species analyzed are inaccessible to vehicles.

In addition to changes in hydrology and stream morphology due to human activity, native fish populations within the KNF have also been affected by introductions of non-native species on the Forest. Research by Trombulak and Frissell (2000) indicates a distinct correlation between roads and exotic species. They found that “Roads provide dispersal of exotic species via three mechanisms: providing habitat by altering conditions, making invasion more likely by stressing or removing native species, and allowing easier movement by wild or human vectors (Trombulak and Frissell 2000). Several river access points on the Klamath River are proposed for addition to the NFTS. Designation of these areas for motorized use would not affect public access to these sites, nor the introduction of exotic species by humans, as there are numerous other motorized access points along the river on both federal and private lands. The river access sites have been in place for many years; designation would not change their influence on the river habitat. Determining the contribution of these few sites to the problem of exotic fish introduction is beyond the scope of this document.

Motorized Use

There are many factors influencing the aquatic environment on the KNF. While motor vehicle use has had an influence, it has been very minor in comparison to other habitat influences such as dams, agricultural runoff, wildfire, and land management activities. Proportionally, there is little use of riparian areas for motorized vehicles across the landscape on the KNF, primarily due to topography. Of the 437 miles of unauthorized routes, 60.4 (14 percent) are within riparian reserves. However, approximately half of these

routes are located in the Goosenest Ranger District, where no anadromous fish are present and watersheds are interiorly drained (no outlet). In addition, most of the proposed routes are short with an average length of 0.14 mile (716 feet) and are spread throughout the forest; and estimated impacts at the 7th-field HUC watershed scale are too low the be detected and are therefore expected to have very limited effects on fisheries resources. Where motor vehicles have been in direct contact with waterways (such as at stream crossings), impacts have included breaking down and erosion of stream banks and, therefore, increased sediment delivery to watercourses. Changes in riparian vegetation have also occurred in these areas.

Increases in sediment/turbidity are widely known to negatively impact fisheries resources, including invertebrates and fish (Sigler et al., 1984). The use of unauthorized, user created routes in and near watercourses can alter hydrologic function and contribute to increased sedimentation in the aquatic environment. Primary impacts on the KNF are associated with sedimentation into small creeks and channels; material can be mobilized during high flows and can move into larger perennial fish-bearing tributaries of the Klamath River.

Aquatic species are reliant on natural temperature regimes, and when altered, temperature changes can result in the decreased vigor and production of aquatic populations. Stream temperature is very important to the aquatic communities' diversity and structure. Water temperature can mediate competitive interactions between fish species. Reeves et al. (1987) found that the interactions between redside shiners and juvenile steelhead were influenced by temperature. At temperatures of 19 °C to 22 °C shiners displaced trout through exploitive competition (i.e. more efficiently obtaining food), whereas, trout are dominant at temperatures of 12 °C to 15 °C because of interference competition (i.e., preventing access to food by defending territories). Alterations in environmental conditions like temperature may have reduced habitat suitability for some species but increase it for others. With active fire suppression and a reduction in vegetation management activities, vegetation along streams and creeks tributary to the Klamath River has generally increased over the last 50 years. Some sites that have experienced high fire severity from the 2004, 2006 and 2008 fires show significant reductions in vegetation; some of these sites lie along streambanks. Off-road travel along streams and creeks is limited due to topography.

Along the Klamath River, riparian vegetation was highly modified by mining activities that took place in the 1930s and 1940s, and more recently, by private land development and the floods of 1964 and 1997. As the river has channelized, the riparian areas have become more vegetated than they were historically when the flood plains were active seasonally during high flow events. These changes have resulted in decreased stream shading in some areas, and more shading in others. However, shading is most likely not a controlling factor for water temperature in the dam-controlled Klamath River. The amount of riparian vegetation disturbed by off-road motorized travel is minimal, especially when compared with fire effects, and effects on water temperature are not measurable.

Cumulative Effects

According to the Council on Environmental Quality NEPA regulations, '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 FCR § 1508.7). As explained in Chapter 3, Cumulative Effects, the analysis of past actions is based on current environmental conditions. Current environment conditions are, in part, defined by the existing road or route density. The analysis for this section used the change in road density for the seventh field sub-watersheds and perennial stream riparian reserves within the project areas as a proxy for the risk of cumulative watershed effects under each alternative for each of the fish species considered in detail. The results of this evaluation are available in the KNF Motorized Travel Management EIS Fisheries BA/BE. Ongoing and reasonably foreseeable future actions for consideration of potential contributions to cumulative effects are listed in appendix B.

Alternative 1 – No Action

Under this alternative, no changes would be made to the current NFTS and no cross-country travel prohibition would be put into place. Motor vehicle travel by the public would not be limited to designated roads, trails, or areas. There would be no prohibition on cross-country motorized vehicle travel.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Cross-country motorized-vehicle travel frequently results in degradation of riparian vegetation, increased bank erosion, nutrient loading, sedimentation and, hydrocarbon pollution to streams. Motorized vehicles traveling across stream banks degrade those banks, increase future erosion potential, and deliver sediment to streams, increasing turbidity. These changes can increase metabolic rate, respiration, and oxygen demand of fish and amphibians (Jennings 1996). Degraded water quality can result in negative impacts to aquatics resources such as fish and aquatic invertebrates. Water quality can be degraded when OHV-raised dust settles into aquatic systems (Ouren et al. 2007). Cedarholm found that sediment in spawning gravel increased by 2.6 – 4.3 times in watersheds with more than 4.1 miles of road per square mile (Cedarholm et al. 1981). Disturbance in aquatic systems is a particular problem for anadromous fish holding and spawning, reducing spawning success (Moyle et al. 1996). When the index of biotic integrity (IBI) was analyzed on 100 Sierra Nevada watersheds, IBI scores were negatively correlated with the percentages of area containing roads associated with streams (Moyle and Randall 1996). Alternative 1 will leave 508,000 acres that is usable by OHVs open to cross-country travel.

The creation of new unauthorized routes and the continued use of previously established unauthorized routes near watercourses and riparian areas are of increased concern because the majority of these routes are entirely user-created and, therefore, were never designed to effectively move water off the route. While some routes are hardened and self-maintaining, others are located in highly erodible soils or are subject to drainage problems. This can lead to increased amounts of water being captured, and potentially

diverted into streams. It can also be disruptive of the hydrologic processes that function to provide high water quality upon which aquatic species depend. In addition to potential negative impacts to water quality, cross-country motor vehicle travel allows motorists to cause direct mortality through the crushing of individuals as they drive through streams and perennial wet areas. Threatened, endangered, and sensitive species could be negatively affected through continued disruptions in the aquatic environment, and declines in water quality could occur.

Continued use of 437 miles of user-created routes will ensure that these areas will not revegetate. Approximately 60 miles of routes are located in riparian reserves and have 18 stream crossings; these disturbances will not recover in the short or long term. New routes could (and likely would) be created. The actual extent to which fish would be affected as a result of implementing this alternative cannot be quantitatively assessed because of the unknown potential for expansion of the user created route system.

All existing user-created routes located within habitat for the four salmonid species would continue to be available for use.

Direct and Indirect Effects of Adding Facilities to the NFTS

Alternative 1 does not add roads, trails, or areas to the NFTS. There are no direct or indirect effects associated with this activity.

Table 25. Indicator values for alternative 1

Miles of unauthorized routes within Riparian Reserves	Acres Affected within Riparian Reserves	Percentage of Habitat Affected by Routes	Number of Stream Crossings[a]
60.4	121	0.3%	18

a Number of crossings that intersect salmonid habitat (current distribution, suspected range, and suitable habitat)

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Alternative 1 makes no changes to the existing NFTS. There are no direct or indirect effects associated with this activity.

Cumulative Effects

Effects from dam construction, catastrophic floods, natural landslides and fires, over harvest of fish, and human activities on the landscape including timber harvest, off-road travel, flow management, mining, and domestic livestock grazing have affected habitat quality and population levels of fish. The effects of these past activities are captured in the current condition. For this project, cumulative effects are the effects of the ongoing cross-country travel and use of 437 miles of user-created routes added to the effects from ongoing and foreseeable road-related activities.

Under the no action alternative, there would be an increase in soil disturbance and compaction on the 508,000 acres open and usable for cross-country travel. Some disturbed sites may revegetate over time, but the 437 miles of user-created routes are not expected to recover in the short or long term as motorized use will continue. Sixty miles of user-created routes within riparian reserves will be affected. Routes that are located in highly erodible soils and are contributing sediment to streams will continue to do so. The ongoing and foreseeable road-related activities would add 8 miles of ML 1 road and 11 miles of ML 2 road to the NFTS, and decommission 16 miles of road. As part of the project analysis, all of these road actions have or will have water quality evaluations that analyze potential impacts and include mitigations to ensure that water quality is maintained to support beneficial uses.

Application of best management practices during road construction and decommissioning will minimizes the risk of adverse effects to fisheries resources. Only 0.7 mile of new ML 2 road and 3.6 miles of ML 1 road are proposed for the west side of the Forest where fisheries resources are concentrated. These roads will be constructed using Best Management Practices and their contribution to sediment loading is considered minimal and immeasurable. There will be some benefit from decommissioning 16 miles of road on the west side of the Forest. The rest of the ongoing and foreseeable road projects are located on the Goosenest Ranger District, where no anadromous fish are present and most watersheds are interiorly drained (no outlet), and will not affect fisheries resources. The cumulative effect of these activities is a reduction in the mileage of open roads by 5 miles. The primary contributor to cumulative effects would be the continued use of user-created routes, and continued cross-country travel by motorized vehicles.

Alternative 2 – Proposed Action

Under this alternative cross-country travel would be prohibited, additions to the NFTS would occur and, changes to the existing NFTS would occur.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. Vehicle use on about 41 miles of user created routes in riparian reserves would be prohibited, allowing these areas to begin recovering naturally. There would be no new user-created routes, and existing routes should slowly recover in the long term through passive restoration once motorized vehicle use ceases.

This alternative would allow motorized use to continue on 7.2 miles of existing routes within SONCC habitat, 6.4 miles in Chinook habitat, 8.8 miles in steelhead habitat, and 11.7 miles in rainbow trout habitat. Effects on riparian vegetation, soils, and water quality would continue to occur in these areas.

Direct and Indirect Effects of Adding Facilities to the NFTS

Designation of proposed routes would include 19.3 miles of road within riparian areas, and continued use of eight stream crossings. The areas open to cross-country use are not in or adjacent to riparian areas. None of the routes within riparian reserves is considered to have drainage or erosion concerns.

Sixty-five acres of OHV use area (60 acres at Juniper Flat and 5 acres in the Humbug Creek area) would be available for use. The watersheds on which Juniper Flat is situated are mostly interiorly drained (no outlet); there are **no effects** on fisheries resources. The Humbug area does not pose a significant risk to water resources; there should be minimal impacts to fish.

Approximately 4.4 miles of routes in the Humbug area proposed as motorized trails show some level of drainage concern. OHV riders tend to avoid the small gullies in these routes, which is leading to widening of the routes and additional soil compaction and displacement. As routes are widened, opportunities for erosion increase. Prior to release of the MVUM, these routes will be graded and have rolling dips installed, and signing will encourage riders to remain on the established trail. These measures will reduce the amount of sedimentation from these routes over the long term.

Little change is expected to occur in the first year following the addition of routes to the NFTS. The effects of the use of these routes include a minimal contribution of sediment to streams within the analysis area. The sediment that is delivered as a result of the use of these sites is expected to settle rapidly, and **may affect, but is not likely to adversely affect** fisheries resources including SONCC.

Routes that are managed as part of the NFTS will be brought up to standard, and will receive maintenance when needed to address drainage problems. At this time, only 4.4 miles of motorized trails in the Humbug area are expected to require immediate work to stabilize the trail surface and provide more efficient drainage. Road and trail maintenance activities are conducted under the auspices of the Forestwide Facility Maintenance and Watershed Restoration Biological Assessment/Evaluation for the Klamath National Forest (USDA Forest Service 2004) developed in conjunction with the National Marine Fisheries Service. This document analyzes the effects of road and trail maintenance activities on threatened and sensitive salmon and steelhead. Maintenance activities have a determination of either “no effect” or “not likely to adversely affect”. These determinations are discussed in the Travel Management EIS Biological Assessment/Evaluation for fish, which is incorporated by reference and located in the project record.

Table 26. Indicator values for alternative 2

Miles of road or trails within Riparian Reserves added to NFTS	Acres Affected within Riparian Reserves	Percentage of Habitat Affected by Routes	Number of Stream Crossings[a]
19.3	39	0.1%	8

a Number of crossings that intersect habitat (current distribution, suspected range, and suitable habitat)

Direct and Indirect Effects of Changes in Existing Season and Class of Use

There are no direct or indirect effects to fish from changing vehicle class on existing roads.

Cumulative Effects

This alternative added to the ongoing and foreseeable road-related activities would result in a prohibition of cross-country travel on 508,000 acres of available lands, the addition of 8 miles of ML 1 roads and 103 miles of ML 2 roads and motorized trails to the NFTS, decommissioning of 16 miles of road, and designation of 2 areas where cross-country travel is allowed (65 acres). The routes and areas proposed for designation under this alternative are currently in use and there would be no expected change in water quality or runoff (see Hydrology section of this document for more information). There will be a decrease in the short term in the amount of sediment generated by the routes due to grading and drainage improvement on 4.4 miles of motorized trails in Humbug. There will be some benefit from decommissioning 16 miles of road on the west side of the Forest. Most of the ongoing and foreseeable road projects are located on the Goosenest Ranger District, where no anadromous fish are present and most watersheds are interiorly drained (no outlet), and will not affect fisheries resources. The cumulative effect of these activities is a reduction in the mileage of open roads by 5 miles. There is a reduction in effects to fisheries resources associated with removing motorized use from 508,000 acres and 345 miles of existing, unmanaged motorized routes. The cumulative effect of these activities would be beneficial.

Alternative 3 – Cross-country Travel Prohibition Only – No Changes to the Current NFTS

Under this alternative a cross-country travel prohibition would be put into place, and no changes would be made to the current NFTS. Motor vehicle travel by the public would be limited to NFTS routes.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. Vehicle use on about 60 miles of user-created routes in riparian reserves would be prohibited, allowing these areas to begin recovering naturally. There would be no new user-created routes, and existing routes should slowly recover in the long term through passive restoration once motorized vehicle use ceases.

This alternative would eliminate use on all the user-created routes that exist within habitats for SONCC, Chinook KMP Steelhead, and rainbow trout. Effects of motorized use would cease immediately, and revegetation of disturbed sites would occur over time. Implementation of this alternative would have beneficial effects for these species in the long term as these roads recovered.

Direct and Indirect Effects of Adding Facilities to the NFTS

No new facilities would be added under this alternative. There are no direct or indirect effects associated with this activity.

Table 27. Indicator values for alternative 3

Miles of road or trails within Riparian Reserves added to NFTS	Acres Affected within Riparian Reserves	Percentage of Habitat Affected by Routes	Number of Stream Crossings[a]
0	0	0.0%	0

a Number of crossings that intersect habitat (current distribution, suspected range, and suitable habitat)

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes to the NFTS are proposed, so there are no direct or indirect effects associated with this activity.

Cumulative Effects

Effects from dam construction, catastrophic floods, natural landslides and fires, over harvest of fish; and human activities on the landscape including timber harvest, off-road travel, flow management, mining, and domestic livestock grazing have contributed to reduced habitat quality and population levels across the KNF resulting in the current condition as described in the affected environment section of this document.

This alternative does not add mileage to the NFTS; therefore, cumulative effects of this project and ongoing and foreseeable road-related activities are the added effects of those road actions and the prohibition of cross-country travel. The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. Motorized travel on 437 miles of user-created routes would cease. Ongoing and foreseeable road-related activities would add 8 miles of ML 1 roads and 11 miles of ML 2 roads to the NFTS, and decommission 16 miles of road. As part of project analysis, all of these road actions have or will have water quality evaluations that analyze potential impacts and include mitigations to ensure that water quality is maintained to support beneficial uses. Application of Best Management Practices during road construction and decommissioning will minimize the risk of adverse effects to fish and fisheries resources. Cumulative effects should be beneficial due to the cessation of use on 437 miles of routes and 508,000 acres open and usable by motorized vehicles.

Alternative 4 – Maximize Quiet Recreation Opportunities

Under this alternative cross-country travel would be prohibited, additions to the NFTS would occur, and changes to the existing NFTS would occur.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. Vehicle use on about 59 miles of user created routes in riparian reserves would be prohibited, allowing

these areas to begin recovering naturally. There would be no new user-created routes, and existing routes should slowly recover in the long term through passive restoration once motorized vehicle use ceases.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative would add fewer miles of roads and motorized trails to the NFTS than all other action alternatives with the exception of alternative 3. No areas of motorized use are included. Alternative 4 results in the designation of 1 route (.3 mile) within riparian reserves with 1 stream crossing. The route crosses an ephemeral stream in the extreme headwaters of the watershed. This crossing is in an area that is only seasonally wet; no fish are present.

This alternative would eliminate motorized use on all existing unauthorized routes within habitat for SONCC, UKT Chinook, and KMP steelhead. Approximately 0.2 mile of road within rainbow trout habitat would be added to the NFTS. Effects of motorized use on riparian vegetation, soils, and water quality would cease on most of these routes.

Routes that are managed as part of the NFTS will be brought up to standard, and receive maintenance when needed to address drainage problems. The routes in this alternative are all stable and self-maintaining; no maintenance will be required in the short term.

Table 28. Indicator values for alternative 4

Miles of road or trails within Riparian Reserves added to NFTS	Acres Affected within Riparian Reserves	Percentage of Habitat Affected by Routes	Number of Stream Crossings[a]
0.3	1	0.0%	1

a Number of crossings that intersect habitat (current distribution, suspected range, and suitable habitat)

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative proposes 119 miles of mixed use. Changing the type of vehicle use on existing roads will not have any direct or indirect effects on fisheries resources or fish.

Cumulative Effects

This alternative added to the ongoing and foreseeable road-related activities would result in a prohibition of cross-country travel on 508,000 acres of available lands, the addition 8 miles of ML 1 roads and 17.89 miles of ML 2 roads and motorized trails to the NFTS, and decommissioning of 16 miles of road. The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. Motorized travel on 430 miles of user-created routes would cease. The routes and areas proposed for designation under this alternative are currently in use and there would be no expected change in water quality or runoff (see Hydrology section of this document for more information). There will be some benefit from decommissioning 16 miles of road on the west side of the Forest. Most of the ongoing and foreseeable

road projects are located on the Goosenest Ranger District, where no anadromous fish are present and most watersheds are interiorly drained (no outlet), and will not affect fisheries resources. The cumulative effect of these activities is a reduction in the mileage of open roads by 5 miles. There is a reduction in effects to fisheries resources associated with removing motorized use from 508,000 acres and 345 miles of existing, unmanaged motorized routes. The cumulative effect of these activities would be beneficial.

Alternative 5 – Maximize Motorized Recreation Opportunities

Under this alternative cross-country travel would be prohibited, and additions and other changes to the existing NFTS would occur.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. Vehicle use on about 38 miles of user created routes in riparian reserves would be prohibited, allowing these areas to begin recovering naturally. There would be no new user-created routes, and existing routes should slowly recover in the long term through passive restoration once motorized vehicle use ceases.

Direct and Indirect Effects of Adding Facilities to the NFTS

Designation of proposed routes includes 21.8 miles of road within riparian areas, and continued use of 10 stream crossings. None of the routes within riparian reserves are considered to have drainage or erosion concerns.

This alternative would allow motorized use to continue on 11 miles of existing routes within SONCC habitat, 9.1 miles in UKT Chinook habitat, 12.4 miles in steelhead habitat, and 14.2 miles in rainbow trout habitat. Effects on riparian vegetation, soils, and water quality would continue to occur in these areas.

Fifty-three acres would remain open to cross-country motorized travel in two areas. Juniper Flat (48 acres) is located on the Goosenest Ranger District, where no anadromous fish are present and most watersheds are interiorly drained (no outlet), and will not affect fisheries resources. The effects of designating the Humbug area open for cross-country travel are discussed in alternative 2.

Approximately 4.9 miles of routes in the Humbug area proposed as motorized trails show some level of drainage concern. OHV riders tend to avoid the small gullies in these routes, which is leading to widening of the routes and additional soil compaction and displacement. As routes are widened, opportunities for erosion increase. Prior to release of the MVUM, these routes will be graded and have rolling dips installed, and signing will encourage riders to remain on the established trail. These measures will reduce the amount of sedimentation from these routes over the long term.

Little change is expected to occur in the first year following the addition of routes to the NFTS. The effects of the use of these routes include a minimal contribution of sediment to streams within the analysis area. The sediment that is delivered as a result of the use of these sites is expected to settle rapidly, and **may affect, but is not likely to adversely affect** fisheries resources including SONCC.

Routes that are managed as part of the NFTS will be brought up to standard, and will receive maintenance when needed to address drainage problems. At this time, only 4.9 miles of motorized trails in the Humbug area are expected to require immediate work to stabilize the trail surface and provide more efficient drainage. Road and trail maintenance activities are conducted under the auspices of the Forestwide Facility Maintenance and Watershed Restoration Biological Assessment/Evaluation for the Klamath National Forest, developed in conjunction with the National Marine Fisheries Service. This document analyzes the effects of road and trail maintenance activities on threatened and sensitive salmon and steelhead. Maintenance activities have a determination of either “no effect” or “not likely to adversely affect”. These determinations are discussed in the Travel Management EIS Biological Assessment/Evaluation for fish, which is incorporated by reference and located in the project record.

Table 29. Indicator values for alternative 5

Miles of road or trails within Riparian Reserves added to NFTS	Acres Affected within Riparian Reserves	Percentage of Habitat Affected by Routes	Number of Stream Crossings[a]
21.8	44	0.1%	10

a Number of crossings that intersect habitat (current distribution, suspected range, and suitable habitat)

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative proposes 278 miles of mixed use. Changing the type of vehicle use on existing roads will not have any direct or indirect effects on fisheries resources or fish.

Cumulative Effects

This alternative added to the ongoing and foreseeable road-related activities would result in a prohibition of cross-country travel on 508,000 acres of available lands, the addition of 8 miles of ML 1 roads and 67 miles of ML 2 roads and motorized trails to the NFTS, decommissioning of 16 miles of road, and designation of 2 areas where cross-country travel is allowed (53 acres). The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. The routes and areas proposed for designation under this alternative are currently in use and there would be no expected change in water quality or runoff (see Hydrology section of this document for more information). There will be a decrease in the short term in the amount of sediment generated by the routes due to grading and drainage improvement on 4.9 miles of motorized trails in Humbug. There will be some benefit from decommissioning 16 miles of road on the west side of the Forest. Most of the ongoing and foreseeable road projects are located on the Goosenest Ranger District, where no anadromous fish are present and

most watersheds are interiorly drained (no outlet), and will not affect fisheries resources. The cumulative effect of these activities is a reduction in the mileage of open roads by 5 miles. There is a reduction in effects to fisheries resources associated with removing motorized use from 508,000 acres and 378 miles of existing, unmanaged motorized routes. The cumulative effect of these activities would be beneficial.

Alternative 6 – Refined Proposed Action

Under this alternative cross-country travel would be prohibited, and additions and other changes to the existing NFTS would occur.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. Vehicle use on about 40 miles of user created routes in riparian reserves would be prohibited, allowing these areas to begin recovering naturally. There would be no new user-created routes, and existing routes should slowly recover in the long term through passive restoration once motorized vehicle use ceases.

Direct and Indirect Effects of Adding Facilities to the NFTS

Designation of proposed routes includes 20.6 miles of road within riparian areas, and continued use of eight stream crossings. None of the routes within riparian reserves are considered to have drainage or erosion concerns.

This alternative would allow motorized use to continue on 10.4 miles of existing routes within SONCC habitat, 9.1 miles in UKT Chinook habitat, 11.9 miles in steelhead habitat, and 13.4 miles in rainbow trout habitat. Effects on riparian vegetation, soils, and water quality would continue to occur in these areas.

Fifty-three acres would remain open to cross-country motorized travel in two areas. Juniper Flat (48 acres) is located on the Goosenest Ranger District, where no anadromous fish are present and most watersheds are interiorly drained (no outlet), and will not affect fisheries resources. The effects of designating the Humbug area open for cross-country travel are discussed in alternative 2.

Approximately 4.9 miles of routes in the Humbug area proposed as motorized trails show some level of drainage concern. OHV riders tend to avoid the small gullies in these routes, which is leading to widening of the routes and additional soil compaction and displacement. As routes are widened, opportunities for erosion increase. Prior to release of the MVUM, these routes will be graded and have rolling dips installed, and signing will encourage riders to remain on the established trail. These measures will reduce the amount of sedimentation from these routes over the long term.

Little change is expected to occur in the first year following the addition of routes to the NFTS. The effects of the use of these routes include a minimal contribution of sediment to streams within the analysis

area. The sediment that is delivered as a result of the use of these sites is expected to settle rapidly, and **may affect, but is not likely to adversely affect** fisheries resources including SONCC.

Routes that are managed as part of the NFTS will be brought up to standard, and will receive maintenance when needed to address drainage problems. At this time, only 4.9 miles of motorized trails in the Humbug area are expected to require immediate work to stabilize the trail surface and provide more efficient drainage. Road and trail maintenance activities are conducted under the auspices of the Forestwide Facility Maintenance and Watershed Restoration Biological Assessment/Evaluation for the Klamath National Forest, developed in conjunction with the National Marine Fisheries Service. This document analyzes the effects of road and trail maintenance activities on threatened and sensitive salmon and steelhead. Maintenance activities have a determination of either “no effect” or “not likely to adversely affect”. These determinations are discussed in the Travel Management EIS Biological Assessment/Evaluation for fish, which is incorporated by reference and located in the project record.

Table 30. Indicator values for alternative 6

Miles of Unauthorized Routes added within Riparian Reserves	Acres Affected within Riparian Reserves	Percentage of Habitat Affected by Routes	Number of Stream Crossings[a]
20.6	41	0.1%	8

a Number of crossings that intersect habitat (current distribution, suspected range, and suitable habitat)

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative proposes 105 miles of mixed use. Changing the type of vehicle use on existing roads will not have any direct or indirect effects on fisheries resources or fish.

Cumulative Effects

This alternative added to the ongoing and foreseeable road-related activities would result in a prohibition of cross-country travel on 508,000 acres of available lands, the addition of 8 miles of ML 1 roads and 103 miles of ML 2 roads and motorized trails to the NFTS, decommissioning of 16 miles of road, and designation of 2 areas where cross-country travel is allowed (53 acres). The threats to fisheries resources from cross-country motorized vehicle travel described in alternative 1 would be eliminated for most of the Forest with the prohibition of cross-country motor vehicle travel. The routes and areas proposed for designation under this alternative are currently in use and there would be no expected change in water quality or runoff (see Hydrology section of this document for more information).

There will be a decrease in the short term in the amount of sediment generated by the routes due to grading and drainage improvement on 4.9 miles of motorized trails in Humbug. There will be some benefit from decommissioning 16 miles of road on the west side of the Forest. Most of the ongoing and foreseeable road projects are located on the Goosenest Ranger District, where no anadromous fish are present and most watersheds are interiorly drained (no outlet), and will not affect fisheries resources. The

cumulative effect of these activities is a reduction in the mileage of open roads by 5 miles. There is a reduction in effects to fisheries resources associated with removing motorized use from 508,000 acres and 345 miles of existing, unmanaged motorized routes. The cumulative effect of these activities would be beneficial.

Summary of Effects Analysis across All Alternatives

Motor vehicle use on the Klamath National Forest is very low and impacts are dispersed across the landscape. It is unlikely that effects of off-road use will be measurable or discernable from the multiple natural and human-induced changes that occur over the landscape on the KNF. Effects from floods, natural landslides, wildfires, and myriad human activities (flow management, residential development, agricultural runoff, vegetation management on federal and private lands) continue to affect habitat quality and population levels. Effects of OHV-generated sedimentation into the mainstem of the Klamath River are not measurable and insignificant compared with that generated by the current road system, management activities, wildfire, etc.

Table 31. Aquatic biota indicators for all alternatives

	Alternatives					
Indicator	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Miles of unauthorized routes/roads or trails proposed for designation to the NFTS within or adjacent to Riparian Reserves	60	19.3	0	0.3	22	20.6
Acres of Riparian Reserves affected by unauthorized routes/roads and trails proposed for designation to the NFTS	121	39	0	1	44	41
Miles of routes open for use within known or historically occupied TES and MIS habitats:						
SONCC	14.6	7.2	0	0	11.0	10.4
UKT	10.4	6.4	0	0	9.1	9.1
Steelhead	14.7	8.8	0	0	12.4	11.9
Rainbow trout	23.4	11.7	0	0.2	13.4	13.4

Preliminary Determinations for Special Status Species

For SONCC coho, UKT Chinook salmon, KMP steelhead, and rainbow trout:

The KNF Biological Assessment for Fish has made a determination that the implementation of all the action alternatives **may affect, but are not likely to adversely affect** SONCC coho, UKT Chinook salmon, KMP steelhead, and rainbow trout and are not likely to lead toward a loss in population viability.

A **may affect** determination has been made because; the project actions may result, although a highly unlikely one, in a direct effect to some individuals within the project area, but these effects would be limited over the long-term since cross-country travel would be prohibited.

The "not likely to trend towards federal listing or loss of viability" determination is made because 1) the scope of adding the proposed unauthorized routes is limited in area when compared to a fish species' distribution, 2) the species' presence in site-specific areas where routes would be added is highly unlikely, 3) the risk of additional direct or indirect effects to habitat is reduced by prohibiting cross-country travel and, 4) the opportunity for improvement to the species' habitat is higher, when compared to alternative 1 (no action), given the likelihood that more miles of unauthorized routes would be restored over the long term. There would be **no effect** to any fish species or habitat under alternatives 3 or 4.

Table 32. Preliminary determination for TES fish species under alternatives 1, 2, 5, and 6.

Common Name	Scientific Name Status	Status	Preliminary Determination
Upper Klamath-Trinity Rivers (UKT) Chinook salmon	*Oncorhynchus tshawytscha*	Forest Sensitive	May affect individuals or habitat, but is not likely to trend towards federal listing or a loss of viability to the population
Klamath Mountains Province(KMP) Steelhead trout	*Oncorhynchus mykiss*	Forest Sensitive	May affect individuals or habitat, but is not likely to trend towards federal listing or a loss of viability to the population
Rainbow Trout	*Oncorhynchus mykiss*	MIS	May affect individuals, but is not likely to trend towards federal listing or a loss of viability to the population
Southern Oregon/Northern California Coasts (SONCC) Coho Salmon	*Oncorhynchus kisutch*	Federally Threatened	May affect individuals or habitat, but is not likely to adversely affect
Short Nose Sucker	*Chasmistes brevirostris*	Federally Endangered	No effect
Lost River Sucker	*Catostomus luxatus*	Federally Endangered	No effect

Consultation

The Southern Oregon/Northern California Coasts (SONCC) Coho Salmon was listed as Threatened on May 6, 1997 (62 FR 24588). This status was reaffirmed in a Final Rule published on June 28, 2005 (70 FR 37160). Informal consultation was initiated in December of 2008 with the U.S. Fish and Wildlife Service (USFWS). A biological assessment will be completed and used to enter into formal consultation with USFWS.

Compliance with the Forest Plan and Other Direction

Endangered Species Act (ESA). All alternatives comply with the ESA. None of the alternatives, if implemented, would be likely to jeopardize the continued existence of a threatened or endangered species (TES), or result in the destruction or adverse modification of habitat of such species that is determined to be critical.

Forest Service Manual and Handbooks (FSM/H 2670). All alternatives comply with the Forest Service Manual and Handbooks. Impacts to FSS species have been analyzed to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in the BA/BE.

KNF Land and Resource Management Plan (LRMP). All alternatives comply with the KNF LRMP. The management prescriptions for riparian reserves and key watersheds were considered during the analysis process.

3.11 Terrestrial Wildlife

3.11.1 Introduction

Management of terrestrial wildlife 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 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 to the degree consistent with multiple-use objectives established in each Forest LRMP. Management decisions related to motor vehicle travel can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003, Trombulek and Frissell 2000, USDA Forest Service 2000). It is Forest Service policy to minimize damage to vegetation, minimize harassment to wildlife, and minimize 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 travel on NFS lands must consider effects to wildlife and their habitat.

3.11.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action as it affects terrestrial wildlife 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 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. In October 2006, Region 5 developed route designation project design criteria for threatened and endangered species and critical habitat to achieve “no effect” or “may affect not likely to adversely affect” determinations on a programmatic level. The Klamath National Forest was included in the programmatic consultation completed with the U.S. Fish and Wildlife Service on December 27, 2006 whereby the Service concurred that by following the criteria described, route designation activities would have no adverse affects. On March 19, 2009, the local Level One team (Yreka US Fish and Wildlife and Klamath NF biologists) met to review alternative 5 of the Klamath NF Motorized Travel Management project, which proposes the highest level of potential effects of all alternatives. This alternative presents administrative changes in the transportation system and prohibits off-road use Forestwide. Habitat will

not be degraded or removed. The group agreed that alternative 5 would have no effect on northern spotted owl (NSO) or marbled murrelet (MAMU) or to the critical habitat designated for these species.

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 FSS 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.

National Forest Management Act (NFMA) – One of the NFMA requirements dictates the national forests select management indicator species (MIS), which represent larger groups of species filling similar ecological niches or occupying similar habitats. These species and their habitats have been aggregated and described in the Klamath Land and Resource Management Plan (LRMP). During the NEPA process, the project-level MIS effects to these aggregations are analyzed and disclosed. The intent is that the Forest will manage for the needs of representative species or for an assemblage of species using the same habitat. The full MIS analysis is contained in the project file.

Klamath National Forest Land and Resource Management Plan – The LRMP identified the following standards and guidelines applicable to motor vehicle travel management and terrestrial wildlife, which will be applied to all alternatives.

Table 33. LRMP standards and guidelines applicable to terrestrial wildlife species

Topic	Standards and Guidelines
Forestwide	
Geology / Cave Resources	2-7 Management activities near a cave, or the course of such a cave, should be designed in a way to insure protection of the cave resources until a determination can be made about the significance of the cave resource. Cave inventories and the determination of significance should be based on the process outlined by the 1988 Federal Cave Resources Protection Act. 2-9 Avoid alteration of cave entrances or their use as disposal sites for slash, spoils or other refuse. 2-10 Limit public access to caves that could be potentially hazardous to the public, or could result in damage to cave resources. Emphasize enforcement of laws protecting caves from relic collectors and vandalism. Scientific or educational use of caves should be authorized by the Forest Supervisor. 2-11 Foster communication and cooperation between the Forest Service, caving organizations, and recreationists. Information exchange may not be made public if it could lead to the degradation of sensitive caves. 8-38 Design individual projects to protect the value of unique wildlife habitats such as cliffs, caves, and talus slopes.
Sensitive Species	8-18 Avoid or minimize impacts to sensitive species where possible. If impacts cannot be avoided, analyze the potential effects on the population or its habitat within the landscape and on the species as a whole. Projects should not jeopardize species viability or create significant trends toward the need for Federal listing (FSM 2670.22) of sensitive species.

Topic	Standards and Guidelines
Swainson's Hawk	8-37 Restrict activities within 1/4-mile of active Swainson's hawk nests during the nesting season (April 15 to August 15).
Cliff, Cave and Talus	8-38 Design individual projects to protect the value of unique wildlife habitats such as cliffs, caves and talus slopes. 8-39 This provision is intended to apply in matrix forests (regulated land) and in the AMA. For the purposes of this standard and guideline, caves are defined as in the Federal Cave Resources Protection Act of 1988. If bats are found, identify the species using the site and determine for what purpose bats are using it. Protect the site from destruction, vandalism, disturbance from road construction or blasting, or any other activity that could change cave or mine temperatures or drainage patterns. The size of the buffer, and types of activities allowed within the buffer, may be modified through the standards developed for the specific site. 8-40 When Townsend's big-eared bats are found occupying caves or mines on Federal land, the appropriate agency should be notified, and management prescriptions for that site should include special consideration for potential impacts on this species.
Special Emphasis Species (Elk)	8-54 When appropriate, close roads to limit activities that inhibit elk use of quality foraging, fawning/rearing or wintering areas.
Special Emphasis Species (black-tailed deer)	8-50 Close roads when necessary to limit activities that inhibit deer use of quality foraging, fawning/rearing or wintering areas. Maintain or establish roadside screening along open roads in areas important for migration, fawning/rearing or concentrated seasonal use.
Special Emphasis Species (black bear)	8-44 Manage "open" road densities to reduce the level of human interaction with bears during critical times of the year.
By Management Area	
Special Habitat	MA5-17, MA5-51, MA5-68 Manage recreational settings to generally achieve semi-primitive motorized or roaded natural ROS conditions.
Late Successional Reserves	MA5-14 Dispersed recreational uses, including hunting and fishing, generally are consistent with the objectives of LSRs. Use adjustment measures such as education, use limitations, traffic control devices, or increased maintenance when dispersed and developed recreation practices retard or prevent attainment of LSR objectives. MA5-16 Maintain the existing developed recreation sites, trails or other existing facilities as provided for under Transportation and Facilities Management.
Bald Eagle	MA5-43 Establish nest/roost protection areas and primary protection areas around eagle roost and nest site. Management activities within this zone shall be directed toward providing for the biological and physical integrity of the nest/roost site and to minimize human disturbance during periods of use. MA5-48 Develop no new recreation sites in nest protection areas or in eastside winter roost protection areas. Exceptions may occur along westside winter roost areas if they pose no conflict with wintering birds. MA5-49 Direct dispersed recreational activities away from nesting and roosting habitat. MA5-50 Maintain the existing developed recreation sites, trails or other existing facilities. MA5-51 Manage recreational settings to generally achieve semi-primitive or roaded natural ROS conditions.
Peregrine Falcon	MA5-61 Establish nest and primary protection areas around falcon nest sites…These areas should contain the nest and cliff habitat, which directly influences nesting conditions…Direct management activities to minimize human disturbance during nesting periods. MA5-65 Develop no new recreation sites in nest protection areas. MA5-66 Dispersed recreation activities should be directed away from nesting and foraging habitat. MA5-67 Maintain the existing developed recreation sites, trails or other existing facilities. MA5-68 Manage recreational settings to generally achieve semi-primitive or roaded natural ROS conditions.

Topic	Standards and Guidelines
Managed Wildlife Area	MA6-6 Manage recreational settings to generally achieve semi-primitive or roaded natural ROS conditions. MA6-8 Restrict open road densities to 1/2 to 2 miles of open road per square mile to minimize human disturbance. MA7-7 Restrict OHV use.
Riparian Reserves	MA10-23 Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities and/or specific site closures are not effective, eliminate the practice or occupancy. MA10-26 Manage recreational settings to generally achieve semi-primitive or roaded natural ROS conditions. MA10-42 For each existing or planned road, meet Aquatic Conservation Strategy objectives by: a) Minimizing road and landing locations in riparian reserves. b) Preparing road design criteria, elements, and standards that govern construction and reconstruction. c) Preparing operation and maintenance criteria that govern road operation, maintenance, and management. d) Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow. e) Restricting sidecasting as necessary to prevent the introduction of sediment to streams.
Winter Range	MA14-7 Manage recreational settings to generally achieve roaded natural ROS conditions. MA14-9 Access may be limited in order to affect the quality of the habitat. MA14-11 Develop a transportation management schedule that effectively and efficiently provides the necessary access to the area while meeting the desired road density objectives. Roads that are not part of the long-term transportation needs should be closed, stabilized and returned to a natural state. Gate roads that have only seasonal value to control access into the area.
Forage	MA16-7 Manage recreational settings to generally achieve roaded natural or rural ROS conditions. MA16-9 Access may be limited in order to affect the quality of the habitat. MA16-11 Develop a transportation management schedule that effectively and efficiently provides the necessary access to the area while meeting the desired road density objectives. Roads that are not part of the long-term transportation system should be closed, stabilized, and returned to a natural state. Gate roads that have only seasonal value to control access into the area.

3.11.3 Effects Analysis Methodology

This is a site-specific project, for which two levels of analyses have been considered. Appendix A documents the site-specific analysis of individual routes proposed for addition into the NFTS. First, GIS queries were run against the alternatives to identify potential resource conflicts and develop mitigations that would remove or reduce potential impacts. KNF wildlife biologists also utilized ground-level knowledge or district records for data not included in the Forest corporate GIS layers. Second, there is the analysis of each alternative as a whole, which is informed by the site-specific route analysis noted above and other information. The discussion of the direct, indirect, and cumulative effects of each alternative is provided here. For ease of documentation and understanding, the effects of the alternatives are described

separately for three discrete actions and then combined to provide the total direct and indirect effects of each alternative. The combination of these discrete actions is then added to the past, present, and reasonably foreseeable actions in the cumulative effects analysis.

The three discrete actions common to all action alternatives on the KNF are:

(1) The prohibition of cross-country motor vehicle travel

(2) The addition of unauthorized roads, trails, and OHV areas to the National Forest Transportation System (NFTS); and

(3) Changes to the existing NFTS that include changing the vehicle class, prohibiting non-highway vehicle use, or opening use on specifically designated road segments.

Analysis Specific to Late-Successional Species Group

As the species in this group share a habitat affinity for late-successional forests, for this analysis, the vegetation description that characterizes NSO habitat is used as a surrogate for Pacific fisher, goshawks, and marbled murrelet. Murrelet habitat is only considered within zone 2, as defined by USFWS, and the subset of suitable NSO habitat occurring in elevations greater than 4500 feet is considered for marten habitat.

Local decibel levels, type of noise, and especially duration of disturbance is unknown. Given the inability to precisely determine locations, timing, and the duration of activities associated with this action, a conservative approach is taken in this analysis by including the acres of suitable habitat within 0.25 mile (approximately 400 m) from proposed road prisms. In Endangered Species Act consultation with the US Fish and Wildlife Service, the 0.25-mile "disturbance buffer"' reflects the area that would be exposed to vehicular noise, as 0.25 miles is the commonly considered distance at which all noise above ambient levels may adversely affect species when site-specific data on duration, proximity, and intensity of noise is unknown. Specific to alternative 1, acres of suitable habitat available to OHV travel are those occurring on slopes less than 35 percent. Suitable acres on slopes greater than 35 percent and within areas where travel is already prohibited are not considered.

Analysis Specific to Ungulate Group

In a review of literature and their own data, Gaines et al. (2003) describe wildlife interactions with roads and vehicles, emphasizing the ungulate group. For deer and elk in coniferous forests in Washington, these authors apply 300 to 1300 meter (0.2 mile to 0.8 mile) buffer zones depending on road or trail type, season, and use level. Acreage calculations in their analysis did not consider potential influence of topographic features.

The effects of roads on elk habitat suitability have been well documented (Rowland et. al. 2004). Current modeling approaches can predict habitat effectiveness (Wisdom et al. in Allison et al. 2007),

habitat capability (Benkobi et al. 2004), and habitat suitability (Juntti and Rumble 2006, in Allison et al. 2007). The Klamath National Forest Elk Management Strategy (Allison et al. 2007) was developed in cooperation with the Rocky Mountain Elk Foundation, California Department of Fish and Game, and the Six Rivers National Forest. Suitable elk habitat was modeled for Klamath elk herds using frameworks from existing models that involve the interactions of road densities along with cover, forage, and the size and spacing of cover and forage. The Klamath model also evaluated juxtapositions of habitat components in relation to each other as well as road density and road use. This GIS model displays the ability of different seasonal ranges to provide high value elk habitat and identified areas with high restoration potential.

Overall habitat suitability indices for elk were based according to road use categories and a buffer distance from road prisms. Roads were assigned to one of three use categories: primary, secondary and primitive (as described in Benkobi et al. 2004). The approach taken by Gaines et al 2003 applies a much more conservative approach in buffer size than in the Klamath model where buffer distances strongly considered the level of transportation use on the Klamath (see transportation section in this chapter). Primary roads receive a 300m or a 350m buffer depending on season, and secondary roads receive a 60m buffer. Low use "primitive" roads on the Klamath were considered to have no effect on elk use of adjacent forage and/or cover habitats. Areas of concentrated OHV use were analyzed using a 350m buffer. The measure of potential disturbance was determined through GIS analysis. Buffer distances (or potential disturbance) are consistent with the methodology of evaluating habitat suitability in Allison et al. 2007.

The steep terrain on the KNF may also decrease the distance of 'disturbance buffers' applicable to elk and deer, whereby vehicle noise is screened by forested vegetation and steeper slopes. For the purpose of this analysis, buffer distances (used here as a proxy for potential disturbance) are consistent with the methodology of evaluating habitat suitability in Allison et al. 2007:

Forest Service roads were grouped by maintenance level and classified as follows:

- Level 1 = primitive = no buffer
- Level 2 = primitive = no buffer
- Level 3 = secondary = 60 meter summer/winter range
- Level 4 = secondary = 60 meter summer/winter range
- Level 5 = primary = 300 meter in winter range; 350 meter in summer and transition range

Motorized routes may not be distributed evenly; therefore, the cumulative route density was assessed by 7th field watershed where appropriate for the ungulate group (expressed as route miles/square mile). Although specific thresholds regarding route density levels have not been rigorously evaluated for these

species, they are nonetheless calculated to provide the best available framework for comparison of alternatives and for qualitative analysis of potential effects.

Road densities are an important variable in habitat capability models. For black-tailed deer, the LRMP describes desired road densities to achieve certain levels of habitat capability. Less than 1.5 miles of road per square mile is considered to provide high capability and 1.5– 3 miles of road per square mile is considered to provide moderate capability.

Any currently unauthorized route added to the NFTS would be managed as a maintenance level 2 (ML2) road. During the habitat modeling on the KNF it was determined that ML2 roads appear to have no effect on elk use, so for the purposes of this analysis, buffers were not considered.

Behavioral Response: The most commonly described behavioral response in the ungulate group includes displacement and avoidance where animals were reported as altering their use of feeding, breeding, or wintering habitats in response to motorized trails or trail networks. Many studies have documented increased use at greater distances from roads, but elk response varies dependant upon traffic rates (use), proximity of cover adjacent to roads, and type of road. To quantify potential impacts, buffered areas can be applied to roads and trails based on use level and type of habitat. In a review of literature and their own data, Gaines et al. 2003, describe wildlife interactions with roads and vehicles, emphasizing the ungulate group. For deer and elk, these authors apply 300 to 1300 meter (0.2 mile to 0.8 mile) buffer zones depending on road or trail type, season, and use level. Acreage calculations in their analysis did not consider potential influence of topographic features.

Physiological Response: Gaines et al. review literature documenting physiological responses in ungulates responding to vehicular activity. Elk have exhibited elevated stress hormones when exposed to snowmobiles, vehicle use on primary roads, and in response to primary (open) road density. Authors caution interpreting these effects, as the relationship between population dynamics and stress hormones are not well understood. Increased heart rate and flight response has also been documented in elk (Ward and Cupal 1979, in Rumble et al. 2005).

Analysis Specific to Riparian Group

Riparian-associated species primarily use the linear riparian zones, but some species utilize upland areas also. Western pond turtles, red-legged frogs, and willow flycatchers will use upland slopes or areas away from the water for feeding, breeding, or dispersing. Most of this area is within the boundaries of the identified riparian reserves. To capture potential impacts to this upland area, data are presented by miles of routes within riparian habitats, and by miles of routes within riparian reserves. It is difficult for an analysis at this scale to precisely quantify effects to suitable habitat for these species because of the microsite conditions found in occupied habitat.

GIS habitat query results likely under-represent actual conditions because remote sensing and the vegetation classification models may not have captured the attributes of the small-scale riparian habitats

potentially used by this focal group, or they may classify polygons based on overstory cover rather than the riparian cover (Creasy, personal communication, Torpin, personal communication).

Miles of routes (and their equivalent acres) occurring through riparian reserves of all perennial and intermittent streams (a buffer of up to 300 feet depending on stream classification) is presented for the tailed frog and long-tailed vole. Effects based on miles of routes within riparian reserves may be over-estimated, because not all riparian reserves contain riparian vegetation utilized by these species; it is difficult for an analysis at this scale to precisely quantify suitable habitat for these species because of the microsite conditions found in occupied habitat. Mapped acres of riparian habitat within riparian reserves are assumed to contain riparian habitat or microhabitats suitable for all riparian focal species.

Assumptions Specific to Terrestrial Wildlife Analyses

1. Location of a trail or route is equal to disturbance effects from that trail or route (i.e., it is assumed all routes provide the same level of disturbance), unless local data or knowledge indicate otherwise.

2. All vehicle types result in the same amount of disturbance effect to wildlife. As such, no direct or indirect effects are expected from changing miles of mixed use (non-highway legal vehicle use on specified segments of NFTS roads); therefore, there will be no further analysis pertaining to potential impacts to terrestrial wildlife or their habitats from a change in allowed vehicle type.

3. Effects to known sites are evaluated using existing data. Where occupancy is not confirmed, suitable habitat is assumed to be occupied.

4. Habitat loss is not expected to occur under any action alternative. Habitat in the prism of existing routes is already impacted in the short-term due to soil displacement and compaction, loss of vegetation, and noise disturbance. In the long-term, habitat will improve to some degree due to passive vegetation restoration on undesignated unauthorized routes, and a reduction in the potential for noise disturbance due to the prohibition on cross-country travel (see soils section for further assumptions on recovery).

5. There is no road decommissioning planned or considered at this time under any alternative.

6. The spatial boundaries of the analysis area encompass the entire forest. Effects to wilderness, private lands, other State or Federal non-NFS lands or large perennial water bodies are not expected to occur as a result of this action.

7. Winter activities using snowmobiles or other over-snow vehicles are outside the scope of this project analysis. The effects of cross-country use by snowmobiles were not analyzed.

8. Two routes (41N01 and 40N51) totaling about 10 miles are proposed to be changed from maintenance level 1 to level 2. These routes are located in remote areas with fairly high road densities, and have been opened sporadically in the past for fire access and survey purposes (Talley,

Johnson, personal communication). This administrative change would not result in a measurable change in traffic, so no direct or indirect effects to terrestrial wildlife or their habitats are expected. Therefore, the change in maintenance level for these roads is not further analyzed included in this document.

9. "Equivalent Acres" were calculated using an estimate of one linear mile of road/trail = 2 acres.

Data Sources

All lands managed by the KNF were considered in the analysis of effects to species and/or their habitats. A regional mapping methodology has been developed to capture forest vegetation characteristics using automated, systematic procedures, remote sensing classification, photo editing and field based observations. Forest-level GIS habitat layers produced from 2004 remote sensing imagery and processed in 2007 using the CALVEG classification system were used for evaluating potential impacts to most terrestrial wildlife species. The Northern Spotted Owl (NSO) Suitable Habitat layer was updated in 2008, and is validated at the project-specific scale. Generally the data has been found to be reliable for large-scale analysis. Specific datasets used include:

- Forest GIS layers provided proposed routes relative to habitats and 'designated' or important wildlife areas.
- District maps, species records, or site-specific personal knowledge was also used where Forest-level data were not current or not available.
- GIS layers for deer winter range and key elk habitats were provided by California Department of Fish and Game (CDFG).
- U.S. Fish and Wildlife Service online Listed/Proposed Threatened, and Endangered Species for the Klamath National Forest. Document Number: 630980437-103625. October 20, 2008. No changes to listing status or no new species have been added since this date.

Terrestrial Wildlife Methodology by Action:

1. Direct and Indirect Effects of the Prohibition on Cross-country Travel

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Klamath National Forest.

Indicator(s): Acres open to motor vehicle use and miles of unauthorized routes within terrestrial wildlife habitat.

Methodology: GIS analysis of existing unauthorized routes in relation to habitat.

Rationale*:* Studies have documented that motor vehicle travel can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003, Trombulek and Frissell 2000, USDA Forest Service 2000).

2. Direct and Indirect Effects of Adding Facilities to the NFTS

Short-term timeframe*:* 1 year

Long-term timeframe*:* 20 years.

Spatial boundary*:* Klamath National Forest.

Indicator(s)*:* (1) Density of added motor vehicle routes (ungulates only); (2) Miles of added motor vehicle routes; (3) Number of sensitive sites (location or site center for the most recent pair or territorial single) for TES species within ¼ mile of an added route or area when known; (4) The proportion of a species (or species group's) habitat that is affected by added motor vehicle routes, including the routes/trails/use area plus disturbance buffer.

Methodology*:* GIS analyses of added routes, trails, and use areas in relation to habitat and important/sensitive terrestrial wildlife areas.

Rationale: Literature indicates that placement of routes 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, Trombulek and Frissell 2000, USDA Forest Service 2000). Road density was only considered for the ungulate group, which has the highest proposed mileage in key habitats. Very few miles are proposed in other species habitats and these miles are dispersed across the Forest.

3. Changes to vehicle class and/or season of use

Effects of changing allowed vehicle class and maintenance level are assumed to have no measurable effect and are not considered in detail in this analysis. Effects from proposals to change or establish season of use are addressed where applicable.

4. 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*:* Klamath National Forest.

Indicator(s)*:* (1) Miles of routes existing (Alternative 1) or proposed for addition to the NFTS (action alternatives); (2) Number of known sites/acres of habitat within ¼ mile of an added route or area, and (3) The proportion of a species (or species group's) habitat that is affected by motor vehicle routes.

Methodology*:* GIS analysis of current, added, and future routes in relation to habitat and important/sensitive terrestrial areas and in context of other past/current and future management actions affecting terrestrial habitat.

Rationale*:* Literature indicates that placement of routes 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, Trombulek and Frissell 2000, USDA Forest Service 2000).

Each indicator was calculated using the sources of information above, and GIS queries. As a result of this analysis, the following adjustments have been made to the methodology described above.

- Acres open to motor vehicle use within terrestrial wildlife habitat. In all action alternatives, the area open to cross-country use (0-65 acres) is so small in relation to the amount of suitable habitat for each evaluated species that this indicator does not provide a meaningful comparison. It will be used only for alternatives 1 and 2 to compare the effects of the current situation against the significant reductions in the action alternatives.

- Density of motor vehicle routes at the watershed level. Average by forest and watershed for the ungulate group, as a measure of habitat effectiveness. Primary (open) road densities per square mile are compared against habitat capability models (KNF LRMP 1995). Habitat capability models for ungulates assess road density, and some proposed route additions are located within identified winter ranges. Changes in road densities at the local scale may result in effects to ungulates, so this indicator is used for the ungulate group. The proposed mileage and dispersed nature of the changes in open road density for all other focal groups make the effects immeasurable at the watershed and Forest scales, so this indicator is not used for any group except ungulates.

3.11.4 Terrestrial Wildlife Affected Environment and Environmental Consequences

General Wildlife

The Klamath National Forest is situated in one of the most remote and biologically diverse areas in the Pacific Northwest. The composition and structure of forest, rangeland, and aquatic ecosystems has resulted in a mosaic of vegetative patterns containing a mixture of seral stages for forests and rangeland. The majority of the Forest (about 80 percent) lies west of Interstate 5, within the Klamath Mountains Geographic Province. This area contains complex vegetation patterns dominated by Douglas fir, ponderosa pine, true fir and mixed conifer-hardwoods. Species composition across the landscape is dictated by elevation, aspect, soil types, and climatic influences. The east side of the Forest (Goosenest

Ranger District) lies in the more open, gentler terrain of the Cascades Province, encompassing portions of the Cascade Range and Modoc Plateau. The dominant forested vegetation type is east side ponderosa pine, often mixed with true fir, mixed conifer and lodge pole pine, with lower elevations on the district dominated by pine/juniper/sage/bitterbrush vegetation types. Significant areas of the Forest are inaccessible to off-road vehicle travel due to steep terrain or areas currently restricting vehicle travel. Approximately 408,000 of the 1.6 million acres on the Forest are currently available and accessible for off-road motorized use (E. Graham pers. comm.).

Natural openings occurring throughout the forest include rock outcrops, open rocky ridges, lakes, and meadow systems. Human created openings include roads, landings, mining sites, and harvested units (mostly planted). Riparian and riparian-shrub habitats can be found throughout the landscape near lakes and ponds, along perennial streams, and along intermittent streams. Important elements of riparian habitats include: predominance of deciduous woody plant communities, presence of surface water and soil moisture, closeness of diverse structural features (such as live and dead vegetation, water bodies, non-vegetated substrates), extensive edge providing structurally heterogeneous wildlife habitats, and distribution of aquatic habitat (i.e., streams and associated vegetation) in long corridors that provide protective pathways for wildlife migrations and movements between habitat blocks.

Wildlife habitat on the Forest is fragmented by variation in vegetation and is influenced by natural and human-caused forces. Fire in California is an important process in many ecosystems, and particularly on the Klamath National Forest, where it is the dominant form of disturbance. Much of the KNF has been affected by wildfire, and some of those burned areas have been subsequently harvested and planted. Areas outside of wilderness have been altered by past timber harvest and road construction, particularly in areas with mixed ownership (Scott River and Oak Knoll Districts) where private lands have been intensively managed for timber. This leads to a continuum of wildlife habitats subject to continual changes, many of which are difficult to accurately assess. Fire data from FS Region 5 between 2000 and 2008 suggests that of forested stands burned, approximately 68 percent still maintained a “forested condition” where the stands as a whole remain intact (USDA 2009). In these areas, fires have burned at low and moderate burn severities such that residual forest structure is retained. Fire intensities and their effects vary based on a complex combination of factors including weather, fuels, and topography. In 2008, approximately 174,700 acres burned on the Klamath, much of which occurred in wilderness, LSRs, and Riparian reserves. Fourteen percent of the fire area was considered to have burned at high severity, and nine percent was considered moderate severity (based on RAVG fire severity mapping, D.Torpin, pers. comm.). Moderate severity burns can be highly variable, displaying a mix of lethally burned patches intermixed with vegetation that is not killed. These types of burns contribute to a diversity of vegetative types, habitats, and forest patch sizes and age classes across the landscape. An analysis of direct effects to wildlife habitat due to recent fires has not been completed or considered in the Forest baseline at the time of this analysis.

The Klamath National Forest provides habitat for over 370 species of wildlife, including 92 mammals, 237 birds, 20 amphibians, and 23 reptiles. Currently, two federally listed species and 20 sensitive species are known or highly suspected to occur on the KNF (Table 35). These species and their habitats are described in detail in the KNF Biological Evaluation/Biological Assessment for Travel Management (BE/BA). The LRMP also identified six species associations and 26 species (white-headed woodpecker is listed under two different associations) as management indicator species (MIS) to assess landscape and project-level impacts to habitat conditions (LRMP 4-39, Species Natural History Summary for MIS). Rationale for designation of these MIS is found in the EIS for the Klamath LRMP (1995) and the "LRMP MIS Selection Summary" located in the project file. Some of the management indicator species are addressed here in detail; all management indicator species are addressed in the Klamath NF Motorized Travel Management Project MIS Report (see the project record).

Literature describing the effects of motorized roads and trails on wildlife has 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 groups or assemblages based upon a combination of their biology and interactions with road- and motorized trail-associated factors: (1) late-successional forest (interior forest) associated species; (2) wide-ranging carnivores; (3) ungulates; (4) riparian/meadow-dependent; (5) grassland/sage-steppe, (6) snag/cavity dependent species; (7) and hardwood/hardwood-mixed conifer dependent.

Relying on a review of available literature, Gaines et al. (2003) summarized road and trail-associated factors and their effects upon groups of wildlife species as shown in Table 34.

Table 34. Road- and trail-associated factors with potential effects to habitat or individuals, and the affected wildlife species groups

Road- and Trail-associated Factors	Effects of the Factors	Wildlife Group Affected
Collisions	Death or injury from a motorized vehicle running over or hitting an animal.	Late successional Riparian Wide-ranging carnivores Ungulates
Poaching	Increased illegal take of animals as facilitated by trails and roads.	Wide-ranging carnivores Ungulates
Negative human interactions	Increased mortality of animals resulting from increased contacts with humans, as facilitated by road and trail access.	Wide-ranging carnivores Ungulates
Collection	Collection of live animals (such as amphibians or reptiles) as facilitated by roads or trails or by access.	Late successional Riparian
Displacement or avoidance	Spatial shifts in populations or individual animals away from human activities on or near roads or trails.	Riparian Ungulates Late-successional Wide-ranging carnivores

Road- and Trail-associated Factors	Effects of the Factors	Wildlife Group Affected
Disturbance at a specific location	Displacement of individual animals from a specific location that is being used for reproduction and rearing of young.	Wide-ranging carnivores Ungulates Late-successional Riparian
Physiological response	Increase in heart rate or stress hormones (which may decrease survivorship or productivity) when near a road or trail with loud or sustained noise.	Ungulates Late-successional
Habitat loss, degradation, and/or fragmentation	Loss and resulting fragmentation of habitat due to the establishment of new roads or trails and associated human activities.	Wide-ranging carnivores Late-successional Riparian Ungulates Cavity/Snag dependent
Edge effects	Changes to habitat microclimates associated with the edge induced by roads or trails.	Late-successional
Route for competitors and predators	Providing access or greater hunting success for competitors or predators than would otherwise have existed.	Late-successional Riparian Wide-ranging carnivores
Movement barrier wide-ranging carnivores	Interference with dispersal or other movements due to either the road itself or by human activities on or near roads or trails.	Ungulates Late-successional Riparian

Some of these species may be affected by motorized vehicle use currently occurring on the Klamath National Forest. Effects to individual species and/or their habitats vary depending on time of year, duration, and intensity of use. Wildlife habitats such as riparian vegetation or meadow systems are more vulnerable to disturbance than others; cases of off-road use into meadows have been observed on the Klamath (C. Cheyne, pers. comm.). Due to the Klamath's remoteness and terrain, vehicle use on the KNF is dispersed, although two areas (Humbug and Juniper Flat) are subject to concentrated off-road use.

Table 35. Forest terrestrial wildlife TES, MIS species and habitat associations

Grouping	Species	Status
Late-Successional	Northern Spotted Owl	T/MIS
	Marbled Murrelet	T
	Northern Goshawk	S/MIS
	Great Grey Owl	S
	Pacific Fisher	S/C/MIS
	American Marten	S/MIS
	California Wolverine	S
	Tehamana Chaparral Snail*	S
	Blue-Grey Tail Dropper*	S
Wide-Ranging Carnivores	Sierra Nevada Red Fox*	S
	Black Bear	MIS

Grouping	Species	Status
Ungulates	Black Tailed Deer Roosevelt Elk	MIS Emph
Riparian Dependant (This group combines the Marsh/Lake/Pond and River/Stream and Meadow/Riparian Associations)	Bald Eagle* Willow Flycatcher Northwestern Pond Turtle Foothill Yellow-Legged Frog Greater Sandhill Crane Cascade Frog Southern Torrent Salamander American Dipper Northern Red-Legged Frog Tailed Frog Northern Water Shrew Long-Tailed Vole	S S S S S S S/MIS MIS MIS MIS MIS MIS
Grassland/Sage-Steppe	Pronghorn Swainson's Hawk Burrowing Owl	MIS S MIS
Snag/Cavity-Dependant	Black-backed Woodpecker Downy Woodpecker Hairy Woodpecker Brown Creeper Red Breasted Sapsucker Vaux's Swift Pallid Bat White-headed Woodpecker Pileated Woodpecker	MIS MIS MIS MIS MIS MIS S MIS MIS
Hardwood / Hardwood-Mixed Conifer	Acorn Woodpecker Western Grey Squirrel Flammulated Owl	MIS MIS MIS

Key: T – Federally Threatened; E – Federally Endangered S – FS Sensitive MIS – Management Indicator Species
C-Candidate for Federal Listing Emph – Forest Emphasis
* Effects documentation can be found in the project's Terrestrial Wildlife Biological Evaluation.

For the purposes of this analysis, "focal" species have been selected that represent the range of habitats within the habitat associations. With the exception of federally threatened and Forest Service sensitive species, potential effects to the focal species of each association (not all individual species) will be addressed in this document. The wolverine can be considered a "wide ranging carnivore", but is grouped with the "late successional" group because of its association with attributes found in these habitats.

Species not considered in detail

Western yellow-billed cuckoo – There is no habitat for this species on the Klamath National Forest, and no sightings have been documented.

The **Sierra Nevada red fox's** range includes the KNF but no confirmed locations in the Klamath Province have been recorded since the early 1900s. All recent locations have been in the Lassen Peak vicinity (Figura, personal communication). Additional information can be found in the Biological Evaluation for Sensitive Species, located in the project record.

Bald eagles are common during migration and in winter along major river systems such as the Klamath and Scott Rivers, and in agricultural areas such as Scott Valley. Nine nest sites and four roost sites occur on the Forest. Two are on the west side and the remaining nests and roost sites are on the east side. No currently unauthorized routes or routes proposed for addition to the NFTS occur within nesting or winter roost protection areas or sites, so no effects to bald eagles are expected to occur aside from off road use; therefore, there will be no further analysis in this document. Refer to the biological evaluation located in the project record for further details.

Wolverine sightings range from Del Norte and Trinity Counties east through Siskiyou and Shasta Counties, and south through Tulare County. Habitat distribution in California is poorly known for the North Coast and northern Sierra Nevada. Camera stations and track plate surveys have been conducted on the forest, but these surveys did not find wolverine. There are 10 reliable detections of wolverine on the Klamath National Forest within the last 20 years (USDA 1995) but no den sites are known. The wolverine can also be considered a wide-ranging carnivore, but it is strongly associated with late successional habitats. Potential effects to wolverine are represented in the late-successional species group, and are not described in detail further in this document. Refer to the project biological evaluation located in the project record for further details

Tehama chaparral snail, blue-grey tail dropper, Siskiyou Mountain/Scott Bar salamander - Due to the limited occurrence and/or the subterranean life history it is possible but highly unlikely this species is affected by current off-road use under alternative 1. This species is found beneath the surface for the majority of the year and is unlikely to be disturbed by noise or the road activities associated with all action alternatives described in route designation. Off-road use typically does not occur on talus-dominated sites associated with these species. There would be no effect to habitat or individuals under all remaining alternatives. Additional information can be found in the Biological Evaluation for Sensitive Species located in the project record.

The **tailed frog** is found in remote areas with clear, fast-flowing streams and rivers in montane regions throughout the project area. It is specifically associated with conifer-dominated habitats and montane hardwood-conifer habitats, more commonly in mature or late-successional stands than in younger stands. Suitable habitats most likely occur in areas not accessible by OHVs. Due to its restricted habitats, it is possible but highly unlikely this species is affected by current off-road use under alternative 1. Habitat or individuals would have no effect under all remaining alternatives. Additional information can be found in the Biological Evaluation for Sensitive Species located in the project record.

American dipper, northern water shrews, and Cascade frogs are associated with habitats similar to those utilized by the northern red-legged frog and western pond turtles, which have been selected as focal species for the riparian dependant species group. Potential effects of all alternatives to these species are represented in the in the riparian dependant species group. Additional information can be found in the MIS report located in the project record.

Southern torrent salamander has a limited distribution in northwestern California and is strongly associated with cold mountain streams, springs, and seepages in headwaters and low order tributaries. These are found on the west side of the forest and overall are inaccessible to off-road use. Action alternatives will have no effect. Additional information can be found in the Biological Evaluation for Sensitive Species located in the project record.

Downy, hairy, and white-headed woodpeckers, brown creeper, and Vaux's swifts are widely distributed throughout the Forest. Effects from all alternatives to potential habitats are described in the cavity dependent species group, with emphasis placed on the three species that represent the range of habitats and natural histories within that group (pileated woodpecker, red-breasted sapsucker, and pallid bat). There would be no effect to habitat or individuals under all remaining alternatives. Additional information can be found in the MIS report located in the project record.

The natural history of the **black-backed woodpecker** is described below, but is not considered in detail. This species is strongly associated with burned areas, with very low potential for effects occurring as a result of this action. Additional information can be found in the MIS report located in the project record.

Flammulated owl is one of three species representing the hardwood association. Habitat distribution and potential effects to this group are represented by the western grey squirrel and acorn woodpecker in the hardwood group. Additional information can be found in the MIS report located in the project record.

Townsend's big-eared bat is strongly associated with cave systems and large rock outcroppings. Most of the cave systems are located in remote areas of the Forest or in wilderness and are inaccessible to OHVs, with the exception of the cave system occurring about 0.7 mile from the proposed Juniper Flat use area. Action alternatives will have no effect. Additional information can be found in the Biological Evaluation for Sensitive Species located in the project record.

Affected Environment

Late-Successional Forest Associated Species (Focal species: northern spotted owl, marbled murrelet, northern goshawk, Pacific fisher, American marten)

This species group is associated with mature to old forests that contain late-successional characteristics. These characteristics include large trees for a given growing site, relatively high canopy closure, elevated amounts of decadence in the form of snags (standing, dead trees), down logs, in-tree decay and deformity.

Brief descriptions of suitable habitats and distribution across the Forest is discussed below but further detail can be found in the Klamath National Travel Management Biological Assessment for Proposed, Listed, and Candidate Species or the Biological Evaluation for Sensitive Species. Most of the late-successional habitat is contained in the approximate 396,600 acres designated as late successional reserves (LSRs) on the KNF. Management objectives within LSRs are designed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for the focal species addressed in this analysis. Eighteen large LSRs were mapped as part of the Northwest Forest Plan in addition to eighty-seven 100-acre LSRs located around spotted owl activity centers have been mapped by the Forest. Dispersal habitat and connectivity outside of reserves is provided throughout the landscape by remaining patches of late-successional habitat, riparian reserves, backcountry, roadless and wilderness areas. Further information on natural history and potential effects can be found in this project's biological assessment and evaluation.

Northern spotted owl (*Strix occidentalis*) is managed in accordance with the direction found within the Klamath Land and Resource Management Plan (USDA Forest Service 1995) which incorporated direction from the Northwest Forest Plan (NWFP, USDA 1992 as amended), and the1992 Draft Recovery Plan (USDI 1992). Within large LSRs, 316,780 acres of critical habitat for northern spotted owls has been designated. A small proportion of critical habitat occurs within the matrix. Locally defined suitable nesting and roosting habitat for NSO is as follows: Klamath mixed conifer stands below 6,000 feet in elevation with an overstory of Douglas-fir, ponderosa pine, sugar pine, incense cedar, white fir and/or red fir averaging at or above 18 inches dbh; an understory composed of these same conifers plus hardwoods; a total canopy cover of 60-100 percent; a minimum of two to five snags (average dbh 18 inches) and two to five down logs (average diameter at large end, 18 inches) per acre; the presence of deformed trees (mistletoe, heart rot, etc.); and sufficient open spaces below the canopy for owls to fly (Klamath National Forest definition, January, 2009). Most nests on the KNF are found in mistletoe clumps in large diameter Douglas-fir trees, with a small percentage occurring in snags. A large portion of the Forest has been surveyed to protocol at least once in the last 10 years through timber sale surveys, other project surveys, and studies. Survey efforts have identified approximately 290 NSO activity centers on the Forest. About 474,892 acres of suitable habitat is estimated to occur on the KNF.

The northern goshawk *(Accipiter gentilis)* is a forest hawk with similar habitat needs as the spotted owl; however, territories on the Goosenest District can also be found in mature ponderosa pine/mixed conifer, and higher elevation mature red fir stands. Many of the known goshawk sites on Scott River, Salmon River and Oak Knoll Districts were found incidentally while surveying for owls. Foraging habitat is variable and includes mid- and late-successional forest, natural and man-made openings, and forest edges. Approximately 69 goshawk activity centers are mapped on the west side of the Forest and 41 on the Goosenest Ranger District. 474,892 acres of suitable habitat is estimated to occur on the KNF. Additional details of species life history and habitat associations is provided in the Travel Management BE/BA.

Great grey owls *(Strix nebulosa)* are dependent on meadows for foraging, and on old growth red fir, mixed conifer, or lodgepole pine for nesting (CDFG 1990). Most commonly associated with wet meadows of the Sierra Nevada, it has also been occasionally documented in northwestern California in winter and in the Warner Mountains in summer (McClaskie, et al. 1988). It has also been documented in more mesic sites within the Applegate River drainage to the north of the Klamath, and within 20 miles to the northeast on the Dead Indian Plateau of southern Oregon (Godwin pers. comm. 2005, cited in USDA 2008). Intermittent surveys for great grey owls have been completed on the Forest, but no there have been no observations of pairs or individuals. Suitable habitat on the KNF for the great grey owl (GGO) is considered to be mature and late-successional conifer stands (included in NSO nesting/roosting) with the addition of eastside pine and lodgepole pine that occur within 250 meters of meadows above 5000 feet. It is estimated that 152, 800 acres of GGO suitable habitat occur on the KNF. Additional details of species life history and habitat associations can be found in this project's biological assessment and evaluation.

Marbled murrelet *(Brachyramphus marmoratus)* are generally associated with large trees that have large lateral branches, extensive mistletoe infection, witches brooms, and a mature understory that extends into the canopy. These elements provide nesting substrate. Such characteristics usually do not develop until trees are 150 to 175 years of age. The report issued by the Forest Ecosystem Management Team (FEMAT July 1993) described recommendations provided by the marbled murrelet working team. Two zones were identified based on observed use and expected occupancy. Zone 1 is closer to the marine environment and is associated with most known murrelet activity (USDA and USDI, 1994a). This zone extends approximately 25 to 35 miles inland and includes the western-most portion of the Happy Camp District. Zone 2 occurs from approximately 35 to 45 miles inland. This area is defined for survey purposes and is less likely to support murrelets. For the purposes of this document, suitable murrelet habitat is considered the same as suitable spotted owl nesting/roosting habitat located within 45 miles of the coast. Critical habitat for the marbled murrelet occurs within mapped LSRs in zone 1 (Runaway LSR, and a portion of Seiad LSR). 63,940 acres of marbled murrelet critical habitat have been designated in three units. An estimated 71,296 acres of suitable habitat exist on the KNF.

Pacific fisher *(Martes pennanti)* (Forest Service sensitive species; also a candidate for Federal listing) are scarce residents in California. Fisher habitat distribution occurs from Del Norte and Trinity counties east through Siskiyou and Shasta Counties, and south through the Sierra Nevada to Tulare County (Zeiner et al. 1990). Surveys over the past decade have detected fisher at many locations on the west side of the Klamath, most commonly in mid-to late-seral mixed conifer habitats (Farber and Criss unpublished data 2006, Farber and Franklin, unpublished data 2005) between 3,000 and 6,000 feet (Finley, personal communication). Incidental sightings of fisher have also occurred in several locations, for the most part along major roads and highways associated with rivers or large creeks, but no den sites have been located. No confirmed sitings occur on the Goosenest District. In a study on Hoopa Tribal Lands and on the Shasta Trinity National Forest, fishers selected sites made up of stands with large diameter trees, and dense canopy cover generally situated in drainage-bottoms. They also used black oak

more than expected (S. Yeager, pers. comm. 2005). Suitable denning/resting/foraging habitat for fisher occurs throughout late-successional habitat on the Forest. 474,892 acres of suitable habitat is estimated to occur on the KNF. Additional details of species life history and habitat associations can be found in this project's biological assessment and evaluation.

American marten (*Martes americana)* Optimal habitats are various mixed evergreen forests with more than 40 percent crown closure, with large trees and snags. Important habitats include red fir, lodgepole pine, subalpine conifer, mixed conifer, Jeffrey pine, and eastside pine (Grinnell et al. 1937, Schemof and White 1977, Clark et al. 1987, as cited in Zeiner 1990). On the Klamath, marten have been observed in higher elevations on the forest, typically within true fir, lodgepole pine, and subalpine conifer stands. For the purposes of this analysis, NSO habitat above 4500 feet is considered as suitable. Standards and guidelines for both species provide require retaining canopy cover and include retention of large down logs and snags. An estimated 144,466 acres of marten habitat occurs on the KNF.

Wide-Ranging Carnivores (Focal species: black bear)

Carnivores are important indicators of ecosystem integrity in that they influence the structure and reflect the vigor of the prey species upon which they depend. Many large and mid-size carnivores are unique in their response to human-caused habitat changes due to their huge spatial requirements and their sensitivity to the effects of landscape patterns, including such factors as road and edge density (Buskirk and Zielinski 2003). While some mammalian carnivores, such as coyotes, have adapted to the presence of humans, others are documented or suspected to be adversely impacted by disturbance. Black bears occur throughout the Forest and utilize a variety of habitats and seral stages. Black bear was selected as a MIS due to its habitat associations with early and late seral habitats and its need for large down logs for foraging and denning. Management guidance is found in LRMP standard 8-44: Manage "open" road densities to reduce the level of human interaction with bears during critical times of the year. While bears are known to utilize a range of habitats, they are most strongly associated with mature mixed conifer, mature dense mixed conifer, and early seral habitats; approximately 739,730 acres of these vegetation types are found on the Forest.

Ungulates (Focal species within the group: elk and black tailed deer)

This species group is not associated with any one type of habitat, but with a wide variety of rangeland, forest, and brush-field habitats. Elk is a special emphasis species. The Klamath NF is located within the historic ranges of both Rocky Mountain elk and Roosevelt elk. Reintroduction efforts between 1985 and 1996 brought 232 animals from locations in California and Oregon to four locations on the western side of the Forest. Biologists categorize the elk into 2 populations comprised of 10 distinct herds: the Marble Mountains population (8 herds) on the west side of the Forest, and the Goosenest population (2 herds) in the Southern Cascades on the east side (Allison et al. 2007).

The eight distinct herds of the western population vary their elevational range and utilize a variety of habitats, mostly on public lands. Summer range (769,880 acres) is predominately in the lush, high mountain meadows of the Marble Mountain Wilderness, and parts of the Trinity Alps and Russian Wildernesses. Transition range (697,004 acres) is a broad elevation band between the summer and winter range, comprised of Douglas-fir and mixed evergreen types at lower elevations grading into white fir types at higher elevations. Within this conifer matrix, there are occasional brush fields associated with ridge tops, avalanche chutes and ecological disturbance. For the purposes of this analysis, summer and transition ranges are combined. Winter range (223,014 acres) is typically below 2500 feet elevation and is within the Douglas-fir/tan oak and mixed conifer zone. Steep rocky slopes of southerly aspects commonly have canyon live oak as the major hardwood. Remnant deciduous oak woodlands provide valuable grass and forb forage. The greatest forage utilization in the winter range occurs along the river bars and first terraces of the Klamath River, Elk Creek, and Salmon River. Oak woodlands, younger conifer plantations, small meadows, and grassy road right-of-ways and openings, often on private property, are utilized during the winter season.

The two distinct herds of the Goosenest population have characteristics of both Rocky Mountain and Roosevelt elk. These animals are not a result of planned reintroductions, but rather a result of natural population expansions from Oregon herds. They range from the eastern foothills of Shasta Valley north to the Klamath River, and south and east to Deer Mountain, spending most of the winter on private ranches in the Shasta Valley. The gentle slopes from Eagle Rock to the Klamath River above Copco Lake offer many patches of oak woodlands and grasslands. In the spring the elk move south and east to transition and summer ranges around Grass Lake, Bull Meadows and Deer Mountain. The second herd's primary winter range is valley lands, including Pleasant Valley, west of Highway 97, Butte Valley National Grasslands, Butte Valley Wildlife Area and private ranches. The majority of the high quality winter range is located in the uplands immediately adjacent to the valley floor along the southern boundary. The Goosenest winter range contains the highest percentage of high quality forage. In the summer, elk range throughout the mountains to the west and north of Butte Valley and are assumed to go into Oregon. Much of this habitat is drier and typical of eastside pine or juniper woodland habitats interspersed with small glades associated with riparian areas (Allison et al. 2007).

Black Tailed Deer (management indicator species) are widely distributed on the Forest. This species utilizes a variety of habitats during different times of year, with high-quality winter range being the most important. California Department of Fish and Game has identified 509,058 acres of deer winter range in Siskiyou County, with 219,786 acres of this range being located on National Forest System Lands. Winter ranges in Siskiyou County contain some of the highest known densities of black tailed deer in California (2007 Draft Siskiyou County Deer Management Plan). Critical winter ranges are unique and essential habitats located within the general winter ranges of deer, and are required during the harshest winters when deer are forced to the lowest elevations. Critical winter ranges are utilized by deer annually, but the intensity of use can vary greatly from low to high densities depending on the severity of the winter. Land conversion and development, particularly in winter ranges, has been identified by California Department

of Fish and Game as a threat to sustainable deer populations in the state. The KNF has identified specific management areas for deer management including 108,369 acres of fawning habitat, and 60,934 acres of deer winter range for which specific road and recreation management guidelines apply. These habitats provide insulation, cover, and forage necessary for the variations of habitats needed year round.

In the 1990s, CDFG established deer assessment units (DAUs) for monitoring deer in California. DAUs are based on groups of deer that live in similar yet distinct habitat and environmental settings (CDFG 2006). Each DAU consists of multiple zones that can encompass many herds or populations over large geographic areas or ecological provinces. Overall, countywide data (including KNF lands) suggest population declines, imbalanced population structures, and poor herd productivity. Limited presence of male deer and areas lacking high quality habitat are noted as primary causes of declines (Longhurst 1952; Dasmann 1971; CDFG 1998; Schaefer et al. 2002; CDFG 2006; cited in Siskiyou County Deer Management Working Group 2007).

High and moderate habitat capability models for year round, long-term viability describe road density values equating to less than 1.5 mi/sq. mile to 3 mi/sq. mile (USDA 1995). Road density information by 7th field watersheds, by alternative, is included in the hydrology section and project file.

Riparian Dependent Group (Focal species: willow flycatcher, northwestern pond turtle, northern red-legged frog, tailed frog, and long-tailed vole)

This group represents the diverse assemblage of riparian habitats found on the Klamath NF. They occupy a wide variety of riparian habitats, with small ranging species such as the long-tailed vole to wide ranging species that utilize broader and more diverse habitats such as the bald eagle.

Willow flycatcher (*Epidonax trailii*) is listed as both FS sensitive and MIS on the Klamath. These are neotropical migrants found in riparian habitats of various types and sizes, ranging from small willow surrounded lakes or ponds with a fringe of meadow, to grasslands, to willow lined streams or boggy areas. Very little historical information on the Klamath Mountains exists, but since 1994, the Klamath has been conducting systematic mist net surveys to determine local distribution of willow flycatchers on the Oak Knoll and Goosenest Ranger Districts. Seasonal fluctuations throughout the breeding season are reflected by the high numbers caught in the early and late summer. Data suggest breeding does take place nearby, possibly in the Marble Mountains, or in suitable habitat within the Horse Creek Watershed or along the Klamath River. Approximately 3,234 acres of potential habitat for willow flycatchers exists in riparian deciduous shrub habitat along streams on the Forest.

Northwestern pond turtles (*Actinemys marmorata*; FS Sensitive), and **northern red-legged frogs** (*Rana aurora*; MIS) are commonly found in or adjacent to quiet pools of rivers, streams, marshes, and occasionally ponds. Turtles require upland terrestrial habitats for nesting. Nest sites generally occur within 1/4 mile of water sources, and are usually characterized as open areas dominated by grasses and herbaceous annuals with a southern exposure. The distribution of western pond turtles or red-legged frogs on the Forest is not well known, they have been observed in the habitats described above, most frequently

in the Klamath River system and in montane ponds. Aquatic and riparian habitats are protected by standards and guidelines for riparian reserves (USDA 1995). The **tailed frog** (*Ascaphus truei*; MIS) is associated with clear, fast-flowing streams and rivers in montane regions throughout the state. Tailed frogs also in occur colder perennial streams; but are specifically associated with conifer-dominated habitats and montane hardwood-conifer habitats, more commonly in mature or late-successional stands than in younger stands (Bury 1983, Bury and Corn 1988, Welsh 1990, Jennings and Hayes 1994 cited in Zeiner 1990). **Long-tailed vole** (*Microtus longicaudus*; MIS) is a small riparian-dependant mammal found in herbaceous understories of many forest habitats; abundant in montane riparian, as well as fresh emergent wetland, cropland, aspen, grassland, and wet meadow habitats. Approximately 9,270 acres of riparian vegetation and 2,500 miles of perennial rivers, streams, and creeks (KLRMP (1994) occur on the KNF. Distribution of these species is unknown.

Greater sandhill cranes (*Grus canadensis*; FS Sensitive) breed in wetlands and feed in meadows, irrigated pastures, grain fields, bogs, fens, marshes, and nearby fields. Cranes roost at night in open expanses of shallow water. Greater sandhill cranes summer in a broad belt across North America from the Great Lakes to the west coast, north to British Columbia, Alaska and eastern Siberia. Sandhill cranes nest in montane meadows in California from central and eastern Siskiyou County, east and south to Modoc, Lassen, and northern Plumas counties. Large populations of wintering birds can be found in the central valley from Shasta County south to Fresno County. Declines in the number of breeding sandhills in portions of their range and breeding habitat losses in both Oregon and California resulted in the population being classified by the U.S. Fish and Wildlife Service, Region 1, as a sensitive species in 1982 and a California threatened species in 1983. California also listed the GSC as a fully protected species (CDFG 2008). Three breeding pairs are known to occur on the Goosenest district, and five other breeding pairs are located on private lands adjacent to NFS lands.

Foothill yellow-legged frog (*Rana boylii*; FS sensitive) is a moderate sized frog typically light and dark mottled grey, olive, or brown, often with variable amounts of brick red. Historic distributions ranged through most Pacific drainages west of the Sierra/Cascade Crest from the Santiam River, Oregon to the San Gabriel Drainage in southern California (Jennings and Hayes 1988). They are typically found at elevations below 1800 feet (Corkran and Thoms, 1996). Current distribution and abundance of this species has been reduced drastically in the southern portion of its range but still occurs in significant numbers in some coastal drainages. Listed as a California species of special concern, the foothill yellow-legged frog is at risk due to various anthropogenic and environmental threats throughout its range. In some of the larger rivers in California, predation by introduced bullfrogs has been implicated as a cause of their decline. Increased sediment loads in breeding streams also has a potential to reduce survival of eggs. Breeding occurs in the spring, where adults congregate in habitats consisting of shallow, slow flowing water with pebble and cobble substrate, preferably with shaded riffles and pools (Fuller and Lind, 1992). This species is also known to utilize moderately vegetated backwaters, isolated pools, and slow moving rivers with mud substrates. No formal surveys have been conducted on the Klamath National Forest but suitable habitat can be found in streams throughout the Forest.

Grassland/Sage-Steppe (Focal species: Swainson's hawk, pronghorn, burrowing owl)

The **Swainson's hawk** (*Buteo swainsoni*) is a raptor that breeds in the plains and grasslands of the western United States and portions of Canada and Mexico. In North America, this species is associated with grasslands, sage-steppe and agricultural habitats. In many areas, Swainson's hawks have adapted to farmed habitats, particularly alfalfa fields, nesting in windbreaks and farmstead trees, and riparian forests; although nests may be built in shrubs or on the ground in areas where trees are lacking. Nest tree selection is dependant on proximity to foraging habitats that are entirely different from the vegetation selected for nest sites (Woodbridge 1998). The hawks prefer semi-open and open habitats that are best for aerial foraging. Over the last few decades a rapid loss and modification of habitat for Swainson's hawks has been occurring throughout its range, especially in the California Central Valley (Anderson et al. 2007). In the fall, the hawks migrate south to the pampas of Argentina, where they roost and forage in large groups, feeding primarily on grasshoppers found in pastures, alfalfa, and sunflower fields. Significant effects of pesticide use on Swainson's hawks wintering in the pampas of Argentina were reported by Woodbridge et al. (1995) and Goldstein et al. (1997), (as cited in Woodbridge 1998). Farmer education programs and restrictions on use of highly toxic organophosphate pesticides implemented by government and industry appear to have dramatically reduced the impacts of these compounds on wintering Swainson's hawks (Woodbridge 1998).

Surveys in 2005 and 2006 estimated 2,081 breeding pairs in California, with about 95 percent occurring in the Central Valley (Anderson et al. 2007). Approximately 24,480 acres of grassland and juniper habitats occurs on the Goosenest District; not all of which may be considered suitable. Ten nesting territories are known to occur on the grasslands and juniper sage/steppe habitats within Butte Valley on the Goosenest District. Additional territories are known on private lands in Butte Valley (Cheyne, personal communication). Swainson's hawk pairs in Butte Valley frequently select different nest trees each year; nests commonly occur adjacent to farm roads or county roads (Woodbridge personal communication).

Pronghorn antelope (*Antilocapra Americana*) occur on the Goosenest Ranger District, inhabiting the low rolling topography of agricultural areas, sagebrush, bitter brush, grassland, and alkali desert scrub habitats as found in the Butte Valley National Grassland. This species forages on forbs and several brush species including sagebrush. Pronghorn prefer habitat with low vegetation and 5-20 percent shrub cover (KNF LRMP 1994). Fawning habitat includes sagebrush, alfalfa fields, and tall grass. There are 2,754 acres of pronghorn kidding habitat identified on the Goosenest District.

Burrowing owls (*Athene cunicularia*) are yearlong residents of open, dry grassland and desert habitats; and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. The conversion of grassland to agriculture other habitat destruction; invasive plants, and poisoning of ground squirrels have contributed to the reduction in numbers in recent decades (Zeiner 1990). Burrowing owls have been known to occur in six areas of the 18,400 acre Butte Valley National Grasslands, but

intermittent surveys have not located colonies since 1996; feathers and other sign of presence were observed in 2007 at one site (Cheyne, personal communication). In addition to the National Grasslands, 13,400 acres of California Department of Fish and Game Wildlife lands also provides potentially suitable habitat for burrowing owls.

Snag/Cavity Dependent Group (Focal species: white headed woodpecker, red-breasted sapsucker, pileated woodpecker, and pallid bat)

This species group is associated with cavities in trees, and trees with large dead branches and broken tops. All species represented here are MIS, except for the pallid bat, a Forest Service sensitive species. The Klamath LRMP provides for a variety of snag densities, sizes, and green tree retention guidelines for project-level planning (LRMP Sections 8-21 through 8-25). The vegetative diversity of the KNF allows a wide distribution of species in this group, covering over one million acres of habitat containing the range of snags and trees they depend upon. The relative numbers of hard and soft snags in various size classes vary, thereby meeting habitat needs of the different cavity-associated Forest wildlife species. KNF management guidelines indicate snag numbers should range from 2 to 5 per acre, with preference given to large diameters (Table 36). The number of snags on a given acre will vary, depending on the site and on the number of snags within the landscape. Snag averages range from 0.1 per acre in ponderosa pine stands to 15.3 per acre in some east side mixed conifer stands (LRMP 1995).

Table 36. Habitat capability values for snag dependent species habitat

High capability	Moderate capability	Low capability
> 5 per acre	2 - 5 per acre	< 2 per acre

Pileated woodpeckers (*Dryocopus pilieatus*) require the largest snags in this group for nesting and roosting. They are found in mature mixed conifer, Douglas-fir and true fir types containing large numbers of large snags, stumps, and logs for foraging and cover. Pileated woodpeckers are an uncommon, yearlong resident of mature, montane conifer habitats in the North Coast, Klamath, Cascade, and Sierra Nevada Ranges (Zeiner 1990); and are observed throughout the KNF, often while surveying for northern spotted owls or goshawks (J. Johnson, pers.obs.). White-headed woodpeckers are a common, yearlong resident of montane coniferous forests up to lodgepole pine and red fir habitats in the Sierra Nevada, Cascade, Klamath, Transverse, and Peninsular Ranges, and Warner Mountains. They are occasionally found at lower elevations along North Coast and in interior areas (McCaskie et al. 1988, in Zeiner 1990). These woodpeckers excavate nests in broken-topped snags that are completely dead, and in stumps. The nest is generally close to the ground in moderately to extensively decayed wood (Raphael and White 1984, Milne and Hejl 1989, cited in Hillis et al., undated).

Red-breasted sapsucker (*Sphyrapicus rubus*) is an uncommon to fairly common yearlong or summer resident in openly wooded, mountainous parts of California. It occurs from northwestern British Columbia, along the coasts and both the eastern and western slopes of the Cascade Range and Sierra

Nevada south to Kern County; and from Del Norte County east into Modoc County (Zeiner 1990). Nesting habitats include montane riparian, aspen, montane hardwood-conifer, mixed conifer, and red fir; especially near meadows, clearings, lakes, and slow-moving streams. In western Oregon, most birds (18 of 20) nest in snags with >48 cm dbh, with preference for snags in more advanced class of decay (Mannan 1977, as cited in Walters et al. 2002). In northwest California, the majority of nests were in snags or dead portions of live trees (Raphael and White 1984). Some populations of the sub-species occurring in California are migratory, wintering in foothills or lower elevation areas from where they breed (Walters et al. 2002). This species is frequently found along oak and mixed conifer woodlands on the Klamath, Scott, and Salmon River; commonly associated with old homesteads containing old fruit trees (Johnson, personal observation).

The pallid bat (*Antrozous pallidus*) is usually found in low to middle elevation habitats below 6000 feet (Philpott 1997). Populations have declined in California within desert areas, in areas of urban expansion, and where oak woodlands have been lost (Brown 1996). This species, like many other bats, is extremely sensitive to disturbance at roosting and nesting sites. A variety of habitats are used, including grasslands, shrublands, woodlands, and coniferous forests (Philpott 1997). Pallid bats are most common in open, dry habitats that contain rocky areas for roosting. They are a yearlong resident in most of their range and hibernate in winter near their summer roost (Zeiner et al. 1990). Pallid bats are unusual in that most of their food consists of large insects captured on the ground (Verts and Carraway 1998). Day roosts may vary but are commonly found in rock crevices and tree hollows; and have been documented in large conifer snags, inside basal hollows of redwoods and giant sequoias, and bole cavities in oaks (pers. comm. Sherwin 1998). Cavities in broken branches of black oak are very important and there is a strong association with black oak for roosting (pers. comm. Pierson 1996). The large diameter snags found throughout the Forest provide suitable habitat for the pallid bat, although their distribution is unknown.

Hardwood / Hardwood Mixed Conifer (Focal species: acorn woodpecker and western grey squirrel)

This species group is associated with hardwoods, especially mast-producing species such as oaks. **Acorn woodpeckers** (*Melanerepes formicivorus*) are a common, yearlong resident in hardwood and hardwood-conifer habitats, requiring open-canopied stands with large oaks and snags. Range extends through the western Sierra Nevada foothills, Coast Ranges, Klamath Range, and locally on the eastern Sierra Nevada slope from Modoc County to Nevada County (Zeiner 1990). On the KNF, the woodpecker is commonly found in the hardwood stands along the Klamath, Scott, and Salmon Rivers. The **western grey squirrel** is fairly common locally in mature stands of most conifer, hardwood, and mixed hardwood-conifer habitats in the Klamath, Cascade, Transverse, Peninsular, and Sierra Nevada Ranges (Ingles 1965, in Zeiner 1990). This squirrel is commonly found in lower elevation mixed-conifer and mixed-conifer hardwood stands on the KNF.

3.11.5 Environmental Consequences

Public motor vehicle use of roads and trails affects wildlife, directly and indirectly, in a variety of ways that can generally be placed into three categories: effects resulting from human-caused injury or mortality; effects resulting from changes in behavior (disturbance-based); and effects resulting from habitat modification.

Late-Successional Forest Associated Species, Environmental Consequences by Alternative

Effects Common to All Alternatives

Potential direct effects to a species may occur as a result of noise disturbance when vehicle activity occurs within suitable habitat or adjacent to known sites. Effects are virtually impossible to measure in uncontrolled settings like off-road use. A recent review and synthesis of the scientific information regarding noise disturbance and avian species completed by the USFWS indicates that the likelihood of noise-generating activities adversely affecting northern spotted owl (NSO) and marbled murrelet (MAMU) is a function of activity–generated noise levels relative to pre-project noise levels (USDI 2006). In other words, when project-generated noise levels reach or exceed a threshold noise level above ambient noise level, an adverse affect may occur, based on behavioral responses, physiological responses, or both.

Changes to class of use for NFTS routes are not expected to have any detectable impact on wildlife. The source of disturbance, whether an auto, truck, or OHV, is assumed to provide the same magnitude of impact for this analysis. Therefore, while each alternative proposes changes to “mixed use” miles for system roads already open, there will be no change in effects to species considered in this document.

Alternative 1 – No Action

Table 37 displays the number of acres of habitat potentially available for cross-country travel under this alternative for each of the focal groups.

Table 37. Acres of habitat potentially available for cross-country travel in alternative 1

Species	Total Acres of Suitable Habitat	Acres of Suitable Habitat Open to OHV	Percent of Habitat on KNF affected by Cross-country Travel
Late-Successional (NSO)	474,900	102,700	22
Ungulates (Elk/Deer)	1,689,900 / 366,900	594,900 / 198,600	35 / 54
Hardwoods	63,100	9,280	15
Riparian Dependant	9,270	7,220	78
Snag/Cavity Dependant	612,000	150,820	25
Grassland/Sage-Steppe	8,900	8,900	100

Direct and Indirect Effects of the Prohibition of Cross-country Travel

No surveys have been conducted specifically for this project. Species in this group could be affected by a wide variety of road and trail-associated factors including collisions, trapping, collection, displacement or avoidance, disturbance at a specific site, edge effects, habitat loss and fragmentation, movement barrier or filter, and routes for competitors or predators. Included in cross-country travel are the effects from continuation of use on unauthorized routes. The linear effects of travel routes can include disturbance, displacement, microclimate changes, and increased mortality from hunting and trapping (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).

Behavioral Response: Daytime experiments by Delaney et al. (1997) on Mexican spotted owls indicated that spotted owls flushed in response to chainsaw presentations at 200 feet or less, but almost never flushed at longer distances. Data also suggested that continued presentation of noise disturbance might cause birds to habituate to some types of noise (helicopters and chainsaws in this case). Delaney et al. (1999) examined the effects of nocturnal and diurnal noise on Mexican spotted owls during nesting and non-nesting periods, and reported that “Our mean alert response threshold (403 m) corroborates a regional U.S. Fish and Wildlife Service policy that recommends a 400 m buffer zone around spotted owl nest sites.” This statement refers to the disturbance buffer applied by the USFWS for Mexican spotted owls. A buffer of 400 meters equates to approximately 0.25 mile, and is one which has been traditionally been used for evaluating a distance where significant effects for noise disturbance activities could occur.

Physiological response: Wasser et al. (1997) found that stress hormones increased in male northern spotted owls when they were located <0.41 km (0.25 mile) from major logging roads. Long-term effects from elevated stress hormones are unknown, but physical condition or reproductive success may be compromised (Marra and Holberton 1998, in Gaines et al. 2003). Owls are nocturnal, and known to forage in a wide variety of habitats. Activities are not expected to occur at night, therefore, disruption of foraging activities are unlikely.

There is little data available to indicate how, or to what degree, the other late-successional forest species are affected by noise disturbance, although anecdotal information suggests they are fairly tolerant of chronic (ongoing or ambient) noise and less tolerant of acute (sudden or unexpected) noise. Some species can be fairly tolerant of disturbance, depending on adapted "tolerances" of individuals or pairs. Actual disturbance effects are also influenced by site-specific factors such as traffic levels, cover, and topography at the site. Effects on NSO are considered to be representative for other species in this group.

Effects due to noise disturbance are not expected in areas where noise levels generated by the project do not exceed ambient levels. Motorized vehicles have been used on these routes and within dispersed recreation sites for years; the vehicle travel has been ongoing for years. Noise associated with these routes could likely be considered “ambient”; therefore, significant effects are highly unlikely or are not expected to occur at all.

Habitat loss and degradation, mortality, injury, and disturbance: Unauthorized off-road "routes" can develop over time and the potential for repeated use is likely when drivers notice previous routes taken by others. In addition to the normal traffic on existing system roads, off-road use could result in more people using noticeable unauthorized routes to enter forested stands for gathering forest products. Woodcutting could result in the loss of available nest, roost, or den trees for the late-successional group and/or their prey. Because the number of woodcutters seeking snags or downed logs for firewood fluctuates with the cost of heating oil and the cost and efficiency of new heating systems; it is impossible to gauge how these numbers will change over time. Snags may legally be harvested on the Forest, but there are prohibitions on snag removal within LSRs and beyond 100 feet of the road prism. Compliance with these restrictions is limited due to lack of enforcement, intentional disregard, or uncertainty of location (Blessing, Brown, personal communication).

In a study comparing the presence of snags in roaded and unroaded areas, Bate and Wisdom (as cited in Hillis et al. undated) found only a third as many snags near roads, with the greatest difference within 50 meters of road prisms. In addition, they found few areas where snag densities had not been affected to some degree by woodcutting. On the west side of the KNF, direct loss of spotted owl nest trees is expected to be low. Most owl nest trees on the Klamath are not located immediately next to roads, but are typically located in steep drainages where slopes limit off-road use. Snags, especially lodgepole pine, Douglas-fir, and incense cedar, are highly sought after by woodcutters. Direct loss of nest, roost, or den trees due to continued off-road access is most likely to occur on the Goosenest District or portions of the Oak Knoll District where flatter terrain is more common. Much of this landscape is not accessible December through June due to snow.

One assumption associated with continuing cross-country travel Forestwide includes the potential for off-road route proliferation into wildlife habitat. The KNF assumes terrain exceeding 35 percent slopes and lands currently prohibiting vehicles would be inaccessible to OHV use. KNF lands greater than 35 percent slope and outside of land allocations already prohibiting travel is estimated at 508,000 acres (Graham, pers. comm.) and could be available to off-road use. Rate of increase in use is unknown, but assumed. Effects to late-successional habitat and the species in this assemblage can be measured by identifying the suitable habitat currently open to off-road vehicle use (Table 38). Of total LS habitat on the KNF, 102,700 acres (22 percent) is available to OHV use. Off-road use in this alternative includes vehicle travel on the 13 miles of road occurring within or adjacent to suitable habitat. Approximately 7,240 acres of suitable habitat occur within 0.25 mile of these routes. While this is typically the distance at which potential disturbance to LS species occurs, noise from vehicles is not expected to exceed ambient conditions, so adverse effects are not anticipated.

Table 38. Alternative 1 - Miles of routes within 0.25 mile of known sites and acres of potential habitat within 0.25 miles of routes

Late-successional Species Known Sites / Identified Areas	Miles of Unauthorized Routes within 0.25 mile of Habitat
NSO-Fisher-Goshawk Habitat	13
NSO Sites[a]	2 miles/6 sites
NSO Critical Habitat (CHU)	43
Northern goshawk sites[a]	9 miles/13 sites
Marten Habitat	5
Marbled Murrelet Habitat – Zone 2 (Miles within 0.25 mile of habitat)	16
Marbled Murrelet – CHU (ac w/in 0.25 mile of habitat)	2
Late Successional Reserves	44

a - Miles of routes within 0.25 mile of known sites
Note: Figures do not include miles of ML1 roads (year round closures).

Approximately 24 percent of late successional habitats on the KNF are accessible to off-road traffic. There are 13 miles of existing unauthorized routes (26 acres) occurring within or adjacent to late-successional habitat. Applying a 0.25-mile disturbance zone to these 13 miles, shows approximately 7,240 acres of LS habitat could be affected by these routes. Two of the 13 miles occur within 0.25 mile of six known NSO sites, and 9 miles are within 0.25 mile of 13 known goshawk sites.

Marten, fisher, and wolverine could be affected by loss of dens, increased disturbance of individuals and by indirect impacts to prey resulting from off-road use. Snags serving as den sites could be subjected to woodcutting, potentially resulting in the loss of young. Vehicles can also increase disturbance, resulting in additional energy expenditures. Indirectly, vehicles can affect the squirrel populations that these furbearers primarily feed on. Squirrel populations near routes may be impacted by increased disturbance resulting in lowered energy reserves available for the production of young. If cross-country travel is extensive enough to compact soil, 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 and fisher to prey upon. However, this effect is thought to be limited by the generally low road density and by the small home range size of squirrels.

Vehicle collisions may result in injury or mortality but this is unlikely to be common given the mobility and ecology of the species within this group combined with the terrain and dispersed nature of this type of traffic on the KNF, and the low speeds involved on these unimproved routes. Given the expected rarity of these events, they are expected to be inconsequential to species' population dynamics. Assuming an increase of off-highway use, potential for collisions is still low in the long term.

Direct effects due to disturbance include causing individuals to move or alter behavior. These late-successional species could be disturbed during the breeding or nesting season by cross-country travel.

Disturbance could lead to reduced time on the den or nest, thereby threatening eggs, or young, with exposure. Disturbance of foraging behavior is not expected from off-road travel as these activities would typically occur in daylight when these species are in the resting portion of the diurnal cycle. Off-road disturbance impacts are limited by the heavily timbered areas in steep terrain with concentrations of downed wood where late-successional species are likely to occur. In general, these impacts are possible, particularly on the Goosenest District, but not likely. The possibility of off-road disturbance could occur, but would have no measurable impact on long-term population parameters; therefore, the effect on late-successional species from continued cross-country travel is not likely to be significant to the populations.

Indirect effects are more likely to occur in both the short and long term than direct effects. Road and trail networks that could develop through time can fragment habitat, isolating and decreasing the size of habitat patches and increasing edge. This in turn may increase nest predation and parasitism rates by species such as jays or cowbirds (Miller et al. 1998), or provide increased access for generalist competitors or predators, such as coyotes (Buskirk and Ruggiero1994). Due to topography, fragmentation and the effects of edge are more likely to occur on the eastside of the Forest. The potential loss of snags can affect prey habitats, potentially degrading suitable foraging habitat for late-successional species.

Off-road use in habitats such as meadow systems can have long-lasting effects. In a literature review, Ouren et al. 2007 describe the long-term effects of soil compaction before normal ecological processes can recover the soil's texture, even after only a one-pass trail. Such impacts could affect habitat for prey species of great grey owls. Use of wet meadows on the Klamath National Forest by OHVs generally results in resource damage, and is therefore prohibited by the regulations. There has been some OHV use of wet meadows on the Goosenest District (Brown pers. comm.); those sites have been treated to restore functionality. While use of these habitats may occur, to date OHV users have respected the need to avoid wet areas and meadows.

Overall, the impacts to LS species and habitats are not expected to be significant. While 24 percent of LS habitat is "available", the Forest receives dispersed use and little off-road travel, particularly on the east side of the Forest. For the LS group, the continued use of existing routes is unlikely to contribute to direct mortality or generate sufficient disturbance to affect population parameters such as fecundity or mortality rates.

Direct and Indirect Effects of Adding Facilities to the NFTS

No additions to the NFTS are proposed.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes to existing season of use or class of use would occur under this alternative.

Cumulative Effects

The effects of past activities are captured in the current condition. These activities include fires, harvesting timber, trapping, off-road travel, and other human activities on the landscape that have affected the habitat quality and populations of late-successional species. For this alternative, cumulative effects include the impacts from continued cross-country travel and vehicle use on 437 miles of public-created routes added to the effects from ongoing and foreseeable road-related activities (appendix B). Those effects include 11,300 acres of fire management activities and 32,540 acres of vegetation treatments, of varying intensity, potentially affecting late-successional habitats. Unpredictable stochastic events such as wildfires or insect outbreaks may also degrade or remove habitats. These activities and events have the potential to impact species in this group by reducing or removing key habitat elements such as snags and large trees, reducing canopy closure, or degrading foraging habitat.

Under the no action alternative, cumulative effects to LS species include potential increases in noise disturbance and habitat degradation associated with the continued use of user-created routes and continued cross-country travel by motorized vehicles. Thirteen miles of unauthorized routes occur in LS habitat, which equates to approximately 26 acres, or 0.005 percent of the Forestwide suitable LS habitat. If not used, some disturbed sites may revegetate over time, but the proliferation of trails will likely continue over the long term. Cross-country travel would continue on the 102,700 acres currently available, but as described, the impacts from cross-country travel are likely to be low; therefore, the overall effects to this group as a whole are estimated to be low. The continuation of cross-country travel under this alternative would add minimally to negative impacts from large-scale vegetation management activities and landscape-level fires.

The ongoing and foreseeable road-related activities will add eight miles of ML 1 and eleven miles of ML 2 roads to the NFTS, and decommission 16 miles of roads (west side). The ongoing and foreseeable road construction projects are located on the Goosenest Ranger District. Approximately three miles along six road segments are proposed to be added for the Goosenest Late Successional Reserve Habitat Restoration Project. Short term effects to habitat will occur, but the project is designed to provide long-term benefits to LS habitat. Long-term benefits from decommissioning 16 miles of road on the west side of the Forest will also occur for LS species; noise disturbance and edge effects are reduced, and restoration of habitats will occur in the long-term.

Project design standards (PDSs) for road-related projects have been described in a 5-year Forest-wide analysis for the implementation of a variety of facility (including road and trail) maintenance and watershed restoration activities on lands managed by the KNF, including roads managed cooperatively with private land owners (“co-op roads”). All proposed activities that can tier to this plan will follow the PDSs that minimize effects on threatened, endangered, and sensitive species and their habitat, including designated critical habitat. Potential impacts to the NSO, marbled murrelet, and the Pacific fisher are described in the Programmatic Biological Assessment for Facilities Maintenance and Watershed

Restoration Actions (2008-2012) on the Klamath National Forest. Consultation with USFWS for this document was completed on August 13, 2008. Any new road or trail maintenance projects will either tier to this document, or have site-specific consultation documents.

Alternative 1, together with the ongoing and foreseeable road-related activities would result in limited habitat degradation and disturbance effects, or would provide long-term benefits. The combined actions do not contribute to wide-scale LS habitat loss or habitat degradation. Therefore, the impacts from the use of unauthorized routes and cross-country travel are insignificant to LS habitats and populations as a whole. Potential disturbance associated with ongoing and foreseeable actions are short-term in nature and spatially limited. Individual projects undergo resource reviews that evaluate potential disturbance and implement mitigations that reduce or remove potential noise disturbance and habitat effects. When aggregated with other impacts occurring on the landscape, they are imperceptible and discountable.

Alternative 2 – Proposed Action

Direct and Indirect Effects of the Prohibition on Cross-Country Travel

This alternative would benefit the focal species within this group due to cessation of impacts caused by cross-country travel and use of unauthorized routes as described under Alternative 1. The effects of cross-country travel including collisions, displacement or avoidance, disturbance at a specific site, edge effects, additional habitat loss and fragmentation, movement barrier or filter, and routes for competitors or predators would be removed. Access for trapping or animal collection would be significantly reduced. Any changes that result in less motorized disturbance could be viewed as beneficial for these species. In the long-term, LS 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; Focal species would not be affected by disturbance, trampling or indirect impacts to prey or food resources from cross-country vehicle travel. This alternative is considered to be beneficial to the creation and maintenance of late successional habitat.

Direct and Indirect Effects of Adding Facilities to the NFTS

No loss of habitat is expected under this alternative for any species group. This alternative proposes to add 54 miles of roads and 14 miles of motorized trails to the NFTS. These routes and sites are distributed across all six districts of the KNF, with the highest concentration of routes proposed in the Humbug area (Oak Knoll District). The Humbug area is a low-elevation, exposed south-facing exposure dominated by shrub and scattered ponderosa pines. Late successional habitat does not occur in or around this area, though there are thin strips of mature mixed conifer/hardwoods occurring in the Humbug Creek riparian zone. Table 39 displays the route mileage of proposed routes and the proposed unauthorized additions within habitats used by the focal species and the percent change from current condition.

Of the 68 miles of roads and trails proposed in this alternative, less than four miles lie within or adjacent to late-successional habitat, and no routes are proposed within 0.25 mile of known NSO or goshawk sites. Approximately 6,200 acres of suitable habitat occur within 0.25 mile of these routes. While this is typically the distance at which potential disturbance to LS species occurs, noise from vehicles is not expected to exceed ambient noise levels from vehicle travel on existing routes, so adverse effects are not anticipated. Very few known owl or goshawk sites occur adjacent to proposed routes. Approximately 0.3 mile of proposed roads to dispersed sites occur within 0.25 mile of one NSO activity center and approximately 3 miles of proposed roads to dispersed sites occur within 0.25 mile of seven goshawk sites. Noise disturbance is not expected to exceed ambient levels; therefore, disturbance-based impacts to late successional species from these routes would not be measurable. While additional OHV travel may occur, changes in the amount of use are not expected to be measurable.

This proposal also proposes 65 acres within two designated areas that would be open to cross-country travel. These areas are not located in or adjacent to LS habitats; therefore, no effects are expected.

Table 39. Alternative 2 - Miles of routes within 0.25 mile of known sites, within .25 mile of suitable habitat, or within land allocations

LS Species Known Sites / Identified Areas	Miles of Routes Added to the NFTS within LS habitat or within 0.25 mile of LS habitat	
	Roads	Trails
NSO (LS) Habitat	29	0.4
NSO Sites	0.3	0
NSO Critical Habitat (CHU)	3.35	0
Northern Goshawk Sites	3	0
Marten	0.4	0.2
Marbled Murrelet – Zone 2 (Miles within 0.25 mile of habitat)	0.05	0
Marbled Murrelet – Critical Habitat Unit	0	0
Late Successional Reserves	3.5	0

This alternative has significantly fewer miles of open routes available in suitable late-successional habitat or within 0.25 mile of known NSO, goshawk locations, LSRs, and Critical Habitat for NSO and Marbled Murrelet compared to the current situation.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes in season of use are proposed. An additional 119 miles of mixed use are proposed, scattered over portions of 25 roads across the forest. Of the 119 miles, approximately 2.5 miles occurs within 0.25 mile of five NSO activity centers and 1.3 miles occur within 0.25 mile of three known goshawk sites. The source of disturbance, whether an auto, truck, or OHV, is assumed to provide the same magnitude of

impact for this analysis and is not expected to exceed current noise levels; therefore, changes to class of use are not expected to have any measurable impact on late successional species.

Cumulative Effects

The effects of past activities are captured in the current condition; refer to discussion under alternative 1. Cumulative effects are the combined effects of the routes to be added to the NFTS and the effects from ongoing and foreseeable route-related activities (appendix B). Alternative 2 proposes 3 miles of routes (6 acres) in LS habitat be added to the NFTS. Effects of this action, added to the ongoing and foreseeable route-related actions, are not measurable at the Forest scale. Any negative impacts from this alternative appear to be so minor, that when aggregated with other impacts occurring on the landscape, they are imperceptible and discountable. Negative impacts would be countered by the beneficial effects of elimination of cross-country travel on 102,000 acres of LS habitat.

Alternative 3 – Cross-Country Travel Prohibition Only – No Changes to the Current NFTS

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal as described under alternative 2. These include disturbance to animals, and trampling or indirect impacts to prey or food resources associated with off-road use. In the long-term period (20 years), focal species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel. The linear effects of routes would occur from the miles of NFTS routes open for use (Table 40).

Table 40. Alternative 3 - Miles of routes within 0.25 mile of known sites in LS habitat, or within 0.25 mile of LS habitat

Late-successional Species Known Sites / Identified Areas	Miles of Routes Added to the NFTS within LS Habitat or within 0.25 mile	
	Roads	Trails
NSO (LS) Habitat	0	0
NSO Sites	0	0
NSO Critical Habitat (CHU)	0	0
Northern Goshawk Sites	0	0
Marten	0	0
Marbled Murrelet – Zone 2 (Miles within 0.25 mile of habitat)	0	0
Marbled Murrelet – CHU (ac w/in)	0	0
Late Successional Reserves	0	0

Direct and Indirect Effects of Adding Facilities to the NFTS

No routes would be added to the NFTS under this alternative. Focal species habitat would be expected to recover from soil and vegetation impacts caused by motorized travel currently occurring on the 13 miles (and the adjacent 7,240 acres of suitable habitat within .25 mile) of unauthorized routes in LS habitats. Traffic occurring within 0.25 mile of the six owl and 13 goshawk sites would no longer occur.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes to existing season of use or class of use would occur under this alternative.

Cumulative Effects

The effects of past activities are captured in the current condition; refer to discussion under alternative 1. For this alternative, cumulative effects include the beneficial effects of the off-road travel prohibition. Refer to discussion in alternative 1 for ongoing and foreseeable actions.

Cumulative effects to LS species consist of effects of prohibiting cross-country travel and the effects of ongoing and foreseeable road-related activities. Effects of those activities are described in alternative 1. Off-road travel on 102,700 acres and the 13 miles of unauthorized routes within LS habitat would be prohibited; no additional routes would be added. The cross-country travel prohibition is entirely beneficial for LS habitats.

Alternative 4 – Maximize Quiet Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group due to cessation of impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. These effects include disturbance to animals, and trampling or indirect impacts to prey or food resources associated with off-road use. In the long-term, LS habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel.

Direct and Indirect Effects of Adding Facilities to the NFTS

Table 41 summarizes additions to NFTS pertaining to LS species and their habitat. This alternative adds approximately 7 miles of roads and motorized trails to the NFTS, of which about 0.5 mile is within or adjacent to late successional habitat. None of the proposed routes for alternative 4 occur in LSRs, CHUs, or murrelet habitat. There are no routes within 0.25 mile of known NSO sites, but there is 0.1 mile proposed within 0.25 mile of one known goshawk site. Overall, the impacts from these additions would be undetectable, but reflect a significant positive change from the current condition relative to late successional species by reducing the amount of unauthorized travel adjacent to suitable habitat and known sites. Comparing alternatives 2, 5, and 6, the small differences among alternatives are essentially

indistinguishable against the background fluctuations of weather and stochastic events such as fires, which can profoundly affect late-successional species.

Table 41. Alternative 4 - Miles of routes within 0.25 mile of known sites, within 0.25 mile of suitable habitat, or within land allocations

LS Species Known Sites / Identified Areas	Miles of Routes Added to the NFTS within LS habitat or within 0.25 mile of LS habitat	
	Roads	Trails
NSO (LS) Habitat	0.27	0.2
NSO Sites	0	0
NSO Critical Habitat (CHU)	0	0
Northern Goshawk Sites	0.1	0
Marten	0.27	0.2
Marbled Murrelet – Zone 2 (Miles within 0.25 mile of habitat)	0	0
Marbled Murrelet – Critical Habitat Unit	0	0
Late Successional Reserves	0	0

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes in season of use are proposed. An additional 119 miles of mixed use are proposed, scattered over portions of 25 roads across the forest. Of the 119 miles, approximately 2.5 miles occurs within 0.25 mile of five NSO activity centers and 1.3 miles occur within 0.25 mile of three known goshawk sites. While additional OHV travel may occur, changes in the amount of use are not expected to be measurable. The source of disturbance, whether an auto, truck, or OHV, is assumed to provide the same magnitude of impact for this analysis and is not expected to exceed current noise levels; therefore, changes to class of use are not expected to have any measurable impact on late-successional species.

Cumulative Effects

The effects of past activities are captured in the current condition; refer to discussion under alternative 1. Cumulative effects are the combined effects of the routes to be added to the NFTS and the effects from ongoing and foreseeable route-related activities (appendix B). Alternative 4 proposes less than 1 mile of road (2 acres) in LS habitat for addition to the NFTS, the lowest mileage of all alternatives except alternative 3. Effects of this action, added to the ongoing and foreseeable road-related actions, are not measurable at the Forest scale. Any negative impacts from this alternative appear to be so minor, that when aggregated with other impacts occurring on the landscape, they are imperceptible and discountable. Negative impacts would be countered by the beneficial effects of elimination of cross-country travel on 102,000 acres of LS habitat.

Alternative 5 – Maximize Motorized Recreation Opportunities

Direct and Indirect Effects of the Prohibition of Cross-Country Travel

This alternative would benefit the focal species within this group by ending the impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. These effects include disturbance to animals, and trampling or indirect impacts to prey or food resources associated with off-road use. In the long-term period (20 years), focal species habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes to add 17 miles of roads and 53 miles of motorized trails to the NFTS; of these, about two miles lie within or are adjacent to late successional habitat. Additionally, 31 miles of roads would be added to access 42 dispersed recreation sites across the KNF. Of these, less than three miles are within LS habitat or within 0.25 mile of LS habitat. Approximately 7,400 acres of suitable LS habitat occur within 0.25 mile of these routes.

Very few known owl or goshawk sites occur adjacent to proposed routes. Approximately 0.7 mile of proposed routes occur within 0.25 mile of three NSO activity centers and approximately 3 miles of proposed roads to dispersed recreation sites occur within 0.25 mile of eight goshawk territories. Noise disturbance is not expected to exceed levels currently generated by vehicle traffic; therefore, disturbance-based impacts to late successional species from these routes would not be measurable. This proposal also proposes 53 acres within two designated OHV areas that would be open to cross-country travel. These areas are not located in or adjacent to late successional habitat; therefore, no effects are expected to occur.

Table 42. Alternative 5 Miles of routes within 0.25 mile of known sites, within 0.25 mile of suitable habitat, or within land allocations

LS Species Known Sites / Identified Areas	Miles of Routes Added to the NFTS within LS habitat or within 0.25 mile of LS habitat	
	Roads	Trails
NSO (LS) Habitat	4.0	0.8
NSO Sites	0.7	0
NSO Critical Habitat (CHU)	4.8	0
Northern Goshawk Sites	3	0
Marten	2.2	0.2
Marbled Murrelet – Zone 2 (Miles within 0.25 mile of habitat)	0.1	0
Marbled Murrelet – Critical Habitat Unit	0	0
Late Successional Reserves	4.7	0

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes in season of use are proposed under this alternative. Scattered over portions of 33 roads across the Forest, a total of 278 miles of NFTS roads are proposed for mixed use. Of these 278 miles, about 6 miles occur within 0.25 mile of ten known NSO activity centers and about 3 miles occur within 0.25 mile of eight known goshawk sites. While additional OHV travel may occur in response to this change, measurable changes in use are not expected. The source of disturbance, whether an auto, truck, or OHV, is assumed to provide the same magnitude of impact for this analysis, and noise from use is not expected to exceed ambient conditions; therefore, changes to class of use are not expected to have any detectable impact on late successional species.

Cumulative Effects

The effects of past activities are captured in the current condition; refer to discussion under alternative 1. For this alternative, cumulative effects are the combined effects of the routes to be added to the NFTS and the effects from ongoing and foreseeable road-related activities (appendix B). Refer to discussion in alternative 1 for ongoing and foreseeable actions.

Alternative 5 proposes to add 5 miles of roads within LS habitat to the NFTS, which equates to about 10 acres, or 0.001 percent of the Forestwide suitable LS habitat. Effects of this action, added to the ongoing and foreseeable road-related actions, are not measurable at the Forest scale. Any negative impacts from this alternative appear to be so minor, that when aggregated with other impacts occurring on the landscape, they are imperceptible and discountable. Negative impacts would be countered by the elimination of cross-country travel on 102,000 acres of LS habitat.

Alternative 6 – Refined Proposed Action

Direct and Indirect Effects of the Prohibition of Cross-Country Travel

This alternative would benefit the focal species within this group by ending the impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. These effects include disturbance to animals, and trampling or indirect impacts to prey or food resources associated with off-road use. In the long-term, habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel.

Direct and Indirect Effects of Adding Facilities to the NFTS

Table 43 summarizes additions to NFTS pertaining to LS species and their habitat. This alternative proposes to add 41 miles of roads and 18 miles of motorized trails to the NFTS; of these, less than 5 miles lie within or adjacent to late successional habitat. Approximately 7,300 acres of suitable LS habitat occur within 0.25 mile of these routes. Known owl or goshawk sites occur adjacent to some of the proposed routes; approximately 0.6 mile occurs within 0.25 mile of two NSO activity centers and approximately

3.6 miles occur within 0.25 mile of eight goshawk territories (not nest sites). Noise disturbance is not expected to exceed ambient levels; therefore, disturbance-based impacts to late successional species from these routes would not be measurable.

This alternative proposes to add two designated areas (53 acres total) that would be open to cross-country travel. These areas are not located in or adjacent to late succession habitat; therefore, no effects are expected.

Table 43. Alternative 6 - Miles of routes within 0.25 mile of known sites and acres of potential habitat within 0.25 miles of routes

LS Species Known Sites / Identified Areas[a]	Miles of Routes Added to the NFTS within LS habitat or within 0.25 mile of LS habitat	
	Roads	Trails
NSO (LS) Habitat	3.6	0.4
NSO Sites	0.6	0
NSO Critical Habitat (CHU)	4.2	0
Northern Goshawk Sites	4	0
Marten	2.2	0.2
Marbled Murrelet – Zone 2 (Miles within 0.25 mile of habitat)	0.04	0
Marbled Murrelet – Critical Habitat Unit	0	0
Late Successional Reserves	4.2	0

a - Juxtaposition of different routes relative to the existing suitable habitat is responsible for the differences in acreage when comparing alternatives.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes in season of use are proposed. A total of 278 miles of NFTS routes are proposed for mixed use, scattered over the Forest; of these miles, about two miles occur within 0.25 mile of four known NSO activity centers, and less than two miles occur within 0.25 mile of six known goshawk sites. While additional OHV travel may occur, changes in the amount of use are not expected to be measurable. The source of disturbance, whether an auto, truck, or OHV, is assumed to provide the same magnitude of impact, and noise from this use is not expected to exceed ambient conditions. Therefore, changes to class of use are not expected to have a detectable impact on late successional species.

Cumulative Effects

The effects of past activities are captured in the current condition (refer to discussion under alternative 1). For this project, cumulative effects include the impacts from the miles of routes proposed within LS habitat or within 0.25 mile of LS habitat. The additions of the user-created routes are added to the effects from ongoing and foreseeable road-related activities (appendix B). Refer to discussion under alternative 1 for effects of ongoing and foreseeable actions and effects of the application of project design standards.

Alternative 6 proposes to add 4.4 miles of roads within LS habitat to the NFTS, which equates to about nine acres, or 0.001 percent of the Forest-wide suitable LS habitat. Effects of this action, added to the ongoing and foreseeable road-related actions, are not measurable at the Forest scale. Any negative impacts from this alternative appear to be so minor, that when aggregated with other impacts occurring on the landscape, they are imperceptible and discountable.

Comparison of Effects on Late-Successional Species by Alternative

Overall, there is very little difference among the action alternatives. The most significant is the removal of potential effects to late-successional species, their habitats, and or their prey by prohibiting off-road use. These effects are described in alternative 1. Table 44 provides a comparison of selected habitat change metrics by alternative for selected late-successional focal species. TES species determinations are included in the Wildlife BA/BE located in the project file.

Table 44. Comparison of selected habitat change metrics by alternative for selected late-successional focal species

Species	Metric	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
NSO and Pacific Fisher (474,900 acres of habitat)	Habitat available for cross-country travel	102,700 ac	0 ac	0 ac	0 ac	0 ac	0 ac
	Miles of routes in or w/in 0.25 mile of habitat	UA:13	UA: 3.3	UA: 0	UA: 0.29	UA: 4.8	UA: 4.0
	Acres of habitat within 0.25 mile of proposed routes (% of KNF Habitat)	7,240 (2%)	6,200 ac (1%)	0 ac	420 ac (.09%)	7,400 ac (2%)	7,300 ac (2%)
American Marten (Modeled habitat on the KNF 144,466 acres)	KNF habitat available for cross-country travel	36,100 ac	0 ac	0 ac	0 ac	0 ac	0 ac
	Miles of routes in habitat or within 0.25 mile of habitat	UA: 5 mi	UA: 0.6	UA: 0	UA: .29	UA: 2.4	UA: 2.4
	Acres of habitat within 0.25 mile of proposed routes (% of KNF Habitat)	4,074 ac (3%)	2,700 ac (2%)	0 ac (0%)	280 ac (.2%)	2,800 ac (2%)	2,400 ac (<1%)
Marbled Murrelet (Modeled habitat on the KNF 71,296ac)	Habitat available for cross-country travel	102,700 ac	0 ac	0 ac	0 ac	0 ac	0 ac
	Miles of routes in or w/in 0.25 mile of habitat	UA:16	UA: .05	UA: 0	UA: 0	UA: .1	UA: .04
	Acres of habitat within 0.25 mile of proposed routes (% of KNF Habitat)	180	13	0 ac	0	22	11

UA = unauthorized routes that could continue to receive motorized use under continued cross-country travel (Alt 1) or that would be added to the NFTS (all other alternatives)

Ungulate Group, Environmental Consequences by Alternative

Effects common to All Alternatives

Direct effects such as injury or mortality may occur from collisions with vehicles on roadways as well as direct and indirect effects to habitat. However, collisions with vehicles operating off road are likely a rare event and have not been reported to occur within the Forest. At the long-term analysis point (20 years in the future), assuming an increase of off-highway use, direct mortality events could occur more frequently. The most likely impact, both in the short-term and the long-term, would be the disturbance that would cause individuals to move or alter behavior. Human activities may be more significant to this group when occurring near areas where young are reared or on winter ranges (Canfield et al 1999, as cited in Gaines 2003).

Alternative 1 – No Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

In this alternative, cross-country travel would continue along with use of the existing roads on the NFTS. Excluding lands greater than 35 percent slope, private inholdings, wilderness, research natural areas, and backcountry/roadless areas; approximately 508,000 acres is available Forestwide for cross-country travel (Graham, personal communication). Of this, about 400,000 acres are classified as seasonal elk ranges (about 24 percent of total habitat) and 160,000 are classified as seasonal deer ranges (about 95 percent). This alternative would have the most potential impact on the ungulate group from disturbance associated with all unauthorized routes and off-road travel. Observed use on the KNF indicates off-road use is very dispersed due to relatively low user numbers, the remoteness of the Forest, and steep terrain. Gentle terrain over much of the Goosenest District allows off-road use, but even this use is widely dispersed. Low elevation areas in the grassland/sage-step areas allow for high visibility so collisions with deer or elk are unlikely. Forested areas on the KNF typically contain large amounts of downed wood which would prevent users from reaching speeds that could lead to collisions. Given the low amount and dispersed nature of off-road use, the environmental conditions, and the mobility of ungulates, collisions are unlikely. If such collisions were to occur, they would be low enough in number to be inconsequential to species population dynamics.

Direct and indirect effects resulting from off road use also include the degradation of habitats from road and trail networks and repeated disturbance from motorized vehicles that would likely occur. Direct effects to habitat occur when vehicles crush browse plants and displace or compact soil, affecting soil productivity and thereby degrading habitat quality. Crushing could also indirectly lead to other changes in vegetation such as a reduction in development and growth of hiding cover for juveniles or adults, and the introduction of invasives. Road networks (authorized or unauthorized) can result in habitat degradation due to increased edge and fragmentation of contiguous habitat. Such conditions are contributing factors to poor forage conditions, thereby directly affecting overall health and long-term herd viability. All of the

existing routes occur in some type of seasonal ungulate range. Over the long-term, some disturbed sites may revegetate over time, but the 437 miles of user-created routes are not expected to recover in the short or long term as motorized use and proliferation of trails will likely continue, further degrading the quality of habitat.

Table 45 displays the number of acres of habitat potentially available for use under this alternative for the focal species (elk and black-tailed deer) within this group. Two focused off-road use areas currently exist (Juniper Flat and Humbug) that total about 65 acres, but under this alternative other concentrated use areas could develop without advance planning or mitigations. There are no seasonal restrictions on off-highway use which means the likelihood of disturbance occurring in fawning season could be high. The Humbug area occurs in Critical Deer Winter Range, but is just outside key elk summer, transition, or winter habitat areas identified by CDFG. The Juniper Flat area is outside of any key deer or elk range. The two existing concentrated use areas have been in use for years and deer likely have learned to avoid them. About 60 percent of all elk seasonal habitat is exposed to off-road travel.

Table 45. Alternative 1: Potential key habitat for the ungulate group that could be impacted by cross-country, off-road travel

Species	Total Acres of Winter Habitat	Acres of habitat on KNF open to cross-country travel (% of total)	Total Acres of Summer Fawning/Calving Habitat	Percent of all habitat on KNF open to cross-country travel
Elk	223,000	48,250 (22%)	1,467,000	340,570 (23%)
Black Tailed Deer	229,000	107,000 (47%)	108,400	59,900 (55%)

Existing Road Densities

A concentration of unauthorized routes occurs within four 7th field watersheds on the west side of the forest (Humbug area). This area is located in habitat designated by the California Department of Fish and Game as critical deer winter range. These areas are on the edge of habitat mapped as elk winter range. Two of these watersheds currently exceed 3 miles of road per square mile (Little Humbug and Upper Humbug). Four additional watersheds on the east side with current and proposed routes currently exceed 3 miles per square mile.

On the east side, a significant number of unauthorized routes occur within 7th field watersheds. Thirteen of these watersheds currently contain road densities that exceed 3 miles per square mile, which is a variable described in low capability habitats. Reproductive success of animals in low capability habitats is likely to be lower, and long-term herd viability may be limited.

Movements in response to disturbance have been reported to have a negative effect on reproductive activities when disturbance occurs in elk calving areas (Phillips and Alldredge 2000 as reported in Gaines et al. 2003). The majority of deer fawning habitat and about ¼ of the summer and transition ranges for elk are open to off-road use under this alternative (Table 46). In summary, over 400 miles of unauthorized

routes occur in elk spring and summer habitats which equates to about 800 acres. About 180 miles of unauthorized routes occur in seasonal deer ranges, (about 360 acres) with the majority occurring in key winter range. Due to lack of cover for foraging, this may result in negative effects to the species as no opportunities for seasonal restrictions or other management currently in place. Disturbance associated with those acres is equivalent to approximately about 0.05 percent of the total elk seasonal ranges and about 0.1 percent of the total deer seasonal ranges.

Table 46. Alternative 1: Miles of routes within potential key habitat for the ungulate group

Species	Miles of Unauthorized Routes within Winter Range	Miles of Unauthorized Routes within Summer/Fawning Range
Elk	4	403
Black-Tailed Deer	112	66

The majority of currently unauthorized routes are located on the eastern portion of the Goosenest district, where they are distributed throughout many 7th field watersheds. The majority of watersheds contain road densities that exceed values considered as low capability habitat for deer and elk. Three 7th field watersheds on the Oak Knoll District are the only other watersheds with a concentrated area of unauthorized routes (Lower Humbug, Middle Fork Humbug, and Upper Humbug). Road densities within Little Humbug and Middle Fork currently exceed density limitations for low habitat quality. These additions negatively affect the quality of forage and overall range quality.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative does not propose additions to the NFTS.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not have any changes to season of use; therefore no direct or indirect effects are expected.

Cumulative Effects

The effects of past activities are captured in the current condition, including fires, past timber harvest, trapping, off-road travel and other human activities on the landscape that have affected habitat quality and populations of the ungulate group. For this project, cumulative effects include the effects of the continued cross-country travel on about 508,000 acres and vehicle use of 437 miles of public-created routes added to the effects from ongoing and foreseeable road-related activities (addition of eight miles of ML 1 road and eleven miles of ML 2 road to the NFTS, and decommissioning of 16 miles of road). These routes all occur within seasonal habitats for deer or elk and have been addressed in project-specific wildlife analyses. The ML1 roads are closed to vehicle use year-round and should not affect deer or elk or their

habitats. There will be long-term benefits from decommissioning 16 miles of road on the west side of the Forest for deer and elk; noise disturbance and edge effects are reduced, and restoration of habitats will occur over the long-term. Other actions include 11,300 acres of fire management activities and 32,540 acres of vegetation treatments, of varying intensity, potentially affecting ungulate forage and cover. Vegetation treatments have the potential to impact species in this group by removing forage, impeding the growth of forage, or altering vegetative structure that provides cover. Unpredictable stochastic events such as wildfires may also degrade or remove habitats.

Unauthorized routes do not constitute a change to habitats, but an existing condition where impacts to vegetation have already occurred. These conditions will continue into the future as routes continue to be used. In nineteen 7th field watersheds, these routes have degraded habitats from the high road densities. Impacts from this alternative are contributing to the declining habitat conditions described by the Draft Siskiyou County Deer Management Plan. Overall, impacts are likely contributing to the existing trends in black-tailed deer population size, habitat and distribution.

Alternative 1, together with the ongoing and foreseeable road-related activities, would result in limited habitat degradation and disturbance effects. The combined actions do not contribute to wide-scale habitat loss or degradation, but can have significant effects at the watershed level. Potential disturbance associated with ongoing and foreseeable actions are short-term in nature and spatially limited. Individual projects undergo resource reviews that evaluate potential disturbance and implement mitigations that reduce or remove potential noise disturbance and habitat effects. Overall, the impacts from unauthorized routes and cross-country travel may not be significant to ungulate habitats and populations as a whole. When aggregated with other impacts occurring on the landscape, they are imperceptible and discountable given the size of the forest and the amounts of available habitats.

Alternative 2 – Proposed Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group due by ending the impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. The effects of cross-country travel including collisions, trapping, collection, displacement or avoidance, disturbance at a specific site, edge effects, habitat loss and fragmentation, movement barrier or filter, and routes for competitors or predators would be removed. Decreased disturbance could lead to greater foraging efficiency and higher reproductive success. Significant decreases in mileage of unauthorized routes would provide long term benefits for the ungulate group by decreasing the likelihood of disturbance to all key ungulate habitats.

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

This alternative adds the highest mileage of proposed routes in the ungulate habitats compared with other alternatives. Table 47 displays the route mileage within habitats used by the focal species in this group. No loss of habitat is expected under this alternative for this species group. Proposed routes and sites are distributed across all six districts of the KNF, with the highest concentration of routes proposed in the Humbug area (Oak Knoll District). This alternative would close 334 miles of currently unauthorized routes within elk habitats that would remain open to cross-country motorized travel in alternative 1. This represents an 81 percent decrease in miles of routes open to cross-country travel. 146 fewer miles would occur in key deer ranges than currently exist, which represents an 82 percent decrease in the miles of road compared to current condition. Four acres of OHV area are proposed in the Humbug area, which occurs in winter range. A "season of use" would apply from May 1-October 31 to the 21 miles of routes in critical deer winter range to prevent noise disturbing activities during the winter season. The Juniper Flat area is outside of winter range.

Compared with alternative 1, this alternative would result in 91 fewer miles of routes in key wintering habitat for black-tailed deer, thereby providing long-term benefits to this species. Road densities in Little Humbug and Upper Humbug 7th field watersheds in deer winter range would be reduced over the current situation, resulting in conditions considered as meeting low habitat capability for winter range.

Table 47. Alternative 2: Miles of routes within potential key habitats for the ungulate group

Species	Miles of Unauthorized Routes within Winter Range	Miles of Unauthorized Routes within Summer/Fawning Range
Elk	8	69
Black-Tailed Deer	21	10

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Seasonal restrictions are recommended for all 21 miles of roads proposed within key winter habitat, which should mitigate any potential effects from this proposal.

Cumulative Effects

This alternative eliminates the effects of cross-country travel discussed under Alternative 1. Ongoing and foreseeable road-related activities would add of 8 miles of ML 1 road and 11 miles of ML 2 road to the NFTS, and decommission of 16 miles of road. These routes all occur within seasonal habitats for deer or elk. The ML1 roads are closed to vehicle use year-round and should not affect deer or elk or their habitats. For black-tailed deer, the combined effects of the road-related activities and this alternative would be 32 miles of roads in seasonal ranges added to the NFTS, and 16 miles removed through decommissioning, for a net gain of 16 miles (32 acres or approximately 0.01 percent of existing habitat Forestwide). For elk,

the effects of the combined additions to the NFTS are not measurable relative to the amounts of habitat Forestwide, especially given the dispersed nature of proposed routes across the landscape.

Alternative 3 – Prohibition of cross-country travel, no additions to NFTS

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group by ending the impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. Over time, unauthorized routes would recover, providing long term benefits for the ungulate group.

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

No routes would be added to the NFTS under this alternative.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not propose any changes in existing season or class of use.

Cumulative Effects

Refer to discussion regarding benefits of prohibiting cross-country travel listed under alternative 2. Motorized disturbance to habitat associated with 437 miles of unauthorized routes in seasonal habitats would cease; fewer overall opportunities for disturbance would result.

Alternative 4 – Maximize Quiet Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group by ending the impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. Significant reductions in unauthorized routes would provide long term benefits for the ungulate group (see Table 48).

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative adds approximately 7 miles of roads and motorized trails to the NFTS, all of which are located within elk summer and transition ranges (See Table 48). A “season of use” would apply from May 1-October 31 for about 1 mile of routes located in critical deer winter range. This would prevent noise disturbing activities during the winter season. No OHV areas are proposed under this alternative therefore no effects to deer winter range are expected. Changes in road densities in ungulate habitats are insignificant under this alternative.

Table 48. Alternative 4: Miles of routes within potential key habitats for the ungulate group

Species	Miles of Unauthorized Routes Proposed within Winter Range	Miles of Unauthorized Routes Proposed within Summer/Fawning Range
Elk	0	7
Black-Tailed Deer	0.7	0

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not have any changes to season of use.

Alternative 5 – Maximize Motorized Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group by stopping the impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. Significant reductions in route mileage (>80 percent fewer routes) would provide long term benefits for the ungulate group.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes to add approximately 70 miles of roads and motorized trails to the NFTS, of which 58 are located within elk seasonal ranges (See Table 49), and 29 in black-tailed deer habitats. A "season of use" would apply from May 1-October 31 for the 21 miles of routes and OHV area (5 acres) proposed within critical deer winter range in the Humbug area. This would prevent noise-disturbing activities during the winter season. Open road densities would continue to be high in two west side watersheds (Upper Humbug and Little Humbug) and four watersheds on the Goosenest District (Dockwell, Mud Lake, Tennant/Antelope and VanBremmer Well), which provide critical deer winter range. CDFG cites high road density as one factor contributing to declining conditions found in critical deer winter range.

This alternative proposes significantly fewer routes compared to alternative 1. For black-tailed deer, the miles of proposed routes in seasonal ranges are equivalent to 52 acres or approximately 0.02 percent of existing habitat Forestwide (336,900 acres). For elk, the miles of proposed routes are insignificant relative to the amounts of habitat Forestwide, especially given the dispersed nature of proposed routes across the landscape.

Table 49. Alternative 5: Miles of routes within potential key habitats for the ungulate group

Species	Miles of Unauthorized Routes Proposed within Winter Range	Miles of Unauthorized Routes Proposed within Summer/Fawning Range
Elk	10	48
Black-Tailed Deer	21	7

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Seasonal restrictions are recommended for all 21 miles of roads proposed within key winter habitat, which should mitigate any potential effects from this proposal.

Cumulative Effects

This action proposes significantly fewer routes compared to alternative 1. For black-tailed deer, the miles of proposed routes in seasonal ranges are equivalent to 52 acres or approximately 0.02 percent of existing habitat Forestwide (336,900 acres), or 0.12 percent of the combined area potentially impacted by reasonably foreseeable actions (43,840 acres). For elk, the miles of proposed routes are insignificant relative to the amounts of habitat Forestwide, especially given the dispersed nature of proposed routes across the landscape.

Alternative 6 – Refined Proposed Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group ending the impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. Significant decreases in unauthorized routes (almost 90 percent fewer routes) would provide long term benefits for the ungulate group.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes to add approximately 59 miles of roads and motorized trails to the NFTS, all of which are located within elk seasonal ranges (See Table 50). A "season of use" would apply from May 1-October 31 to the 19 miles of routes and four acres of OHV areas located in critical deer winter range. This would prevent noise disturbing activities during the winter season.

Table 50. Alternative 6: Miles of routes within potential key habitats for the ungulate group

Species	Miles of Unauthorized Routes Proposed within Winter Range	Miles of Unauthorized Routes Proposed within Summer/Fawning Range
Elk	8	51
Black-Tailed Deer	19	5

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Seasonal restrictions are recommended for all roads proposed within key winter habitat, which should mitigate any potential effects from this proposal.

Cumulative Effects

Refer to cumulative effects discussion under alternative 1 and alternative 5. This action proposes significantly fewer routes compared to alternative 1, and fewer miles than alternative 5, which over all are insignificant. For black-tailed deer and elk, the miles of proposed routes are insignificant relative to the amounts of habitat Forestwide, especially given the dispersed nature of proposed routes across the landscape.

Summary of All Alternatives

The small effects generated by the action alternatives are essentially undetectable against the background fluctuations of weather and stochastic events such as wildfires. Implementation of any action alternative will have little to no adverse effects on ungulates.

There are significant beneficial effects to the ungulate group from the prohibition of off-road travel, including elimination of noise and vehicle disturbance from important winter range and fawning areas, and the reduction in open road densities. Passive restoration of existing routes would occur through time.

Riparian Group (Focal species: willow flycatcher, northern red-legged frog, western pond turtle, tailed frog, and long-tailed vole)

No surveys have been conducted specifically for this project, and breeding locations are not known from other surveys, so identified riparian habitat is assumed to be occupied. Potential effects to the riparian group are compared to the current condition. Most riparian habitats occur either in perennial stream corridors or wet meadow areas. Species in this group could be affected by a wide variety of road and trail-associated factors including direct mortality, displacement or avoidance, disturbance at specific sites, or habitat degradation (Gaines et al. 2007). Approximately 9,270 acres of riparian habitats occur on the Klamath National Forest.

Indicators: (1) Acres of riparian habitat available for off-road travel; (2) Miles of unauthorized routes (Alternative 1), or roads and trails proposed for addition to the NFTS (action alternatives) within riparian habitats.

Alternative 1 – No Action

Approximately 2,500 miles of perennial and intermittent streams occur on the Forest. Under this alternative, 98 miles of unauthorized routes occur within riparian reserves, representing about three percent of total miles of stream habitat available Forestwide. The effects of cross-country travel include collisions, trapping, collection, displacement or avoidance, disturbance at a specific site, edge effects, habitat loss and fragmentation, movement barrier or filter, and routes for competitors or predators.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative does not prohibit cross-country motorized travel. Direct effects from this alternative could include impacts or mortality to individuals, negative behavioral responses, and loss in reproductive success from OHV noise and activities (Anthony et al. 1995, Buehler et al. 1991, Hamann et al. 1999, McGarigal et al. 1991, Watson 1993, in Gaines et al. 2007). Direct and indirect effects to riparian habitats include crushing or compaction of vegetation from vehicle use, or loss of vegetation from long term use of routes or through the introduction of invasive species. (Potential effects from non-native invasive species are discussed in that section). Breeding sites for the species addressed in this group are generally not known and use is often highly temporal and transitory; thus, potential effects are measured in terms of effects to habitat.

Of the 9,270 acres of riparian habitats Forestwide, about 7,220 acres (78 percent) are estimated to be on slopes less than 35 percent and thus available to OHV travel. Approximately 98 miles of unauthorized routes occur within riparian reserves. Riparian areas are particularly vulnerable to motorized vehicle use because wet soils are more susceptible to compaction, and these habitats often attract high levels of human use (Gaines et al. 2007). Therefore, the likelihood of impacts is high where OHV use occurs in riparian zones. Ouren et al. (2007) notes that mortality rates vary widely according to the habitat and route characteristics. Traffic density, speed, and availability of escape cover can all influence the occurrence and intensity of impacts. The actual extent to which the riparian group is affected as a result of implementing this alternative cannot be quantitatively assessed because of the unknown potential for expansion of the user-created route system and the unknown distribution of these species on the KNF. Under the current management scenario, vehicle travel off designated NFS roads and the utilization of user-created routes would continue and routes likely would proliferate, leading to more habitat disturbance and loss. Currently disturbed areas would be subjected to continued use and would not recover. Table 51 displays the miles of routes within potential habitats for the riparian group.

Riparian-associated species primarily use the linear riparian zones, but some species utilize upland areas also. Western pond turtles, red-legged frogs, and willow flycatchers will use upland slopes or areas away from the water for feeding, breeding, or dispersing. It is difficult for an analysis at this scale to precisely quantify effects to suitable habitat for these species because of the microsite conditions found in occupied habitat. See methodology section for a discussion of habitat analysis assumptions.

Table 51. Alternative 1: Miles of routes within potential habitat for the riparian group

Alternative 1	Total Species Habitat Forestwide[a] / Acres Available to OHV Use	Miles of Unauthorized Routes within Riparian Habitats / Miles within Riparian Reserves	Equivalent Acres of Miles of Routes within Riparian Reserves / Percent of Total RR Area[b]
Willow Flycatcher	3,236 ac / 2,100	0.5 / 98	196 / 6
Western Pond Turtle	9,270 ac / 7,220	3 / 98	196 / 2
Northern Red-Legged Frog	9,270 ac / 7,220	3 / 98	196 / 2
Tailed Frog /LT Vole	2,500 miles[1]	98 / 98	98 / 4

a - Habitat estimated by miles of perennial and intermittent streams.
b - Equivalent acres of miles in riparian reserves divided by Forestwide habitat.

Willow flycatcher: GIS analysis indicates that about 2,100 acres of the 3,200 acres of habitat (about 65 percent), of willow flycatcher habitat is available for OHV use, but there is only 0.5 mile of unauthorized routes within this habitat. There is no documentation of willow flycatcher habitat loss due to off-highway vehicle use on the KNF. Should routes proliferate into these areas, there could be a number of effects. Vehicle use can directly influence reproductive success through displacement of adults or nest abandonment. Long-term indirect impacts could result from vehicle-induced changes to soil water levels affecting willow establishment and growth; however, due to the difficulty of moving a vehicle through established willow stands, this does not appear to be a likely effect. Indirect effects could result from the creation of conditions favorable to invasive species or predators such as cowbirds or ravens.

Riparian-dependent species such as the **western pond turtle**, **northern red-legged frog**, **tailed frog**, and **long-tailed vole** are small and not highly mobile, and are therefore more vulnerable to effects of OHV use in riparian vegetation or along streams. Home ranges for these species are small, so small areas of disturbance can have profound effects on individuals or their home ranges. Tailed frog and long-tailed vole are highly restricted to the zone immediately adjacent to the water and are highly vulnerable to the effects of vehicle use in riparian areas. The potential for effects from ongoing and future vehicle use in riparian areas is likely greater with these species than with any other wildlife group discussed in this document. About 7,220 acres of habitat for the pond turtle and red-legged frog are estimated to be available to OHV use. Approximately three miles of unauthorized routes occur in western pond turtle and northern red-legged frog habitat (about 2 percent of the total habitat). This is the highest level of impact from any alternative.

With no controls or opportunities for mitigations, negative impacts to riparian areas would be expected to occur through the short and long term. In the long term, passive restoration of about 6 acres of riparian habitat and 196 acres of riparian reserves would not occur due to continued vehicle use. Noise and physical disturbance will continue to occur. Intermittent stream areas are usually dry during summer months and are not likely to be occupied; crossing them with a motor vehicle at those times would probably not directly impact riparian habitats or species.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative does not add facilities to the NFTS.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not make any changes to season of use.

Cumulative Effects

Cumulative effects include the impacts from continued cross-country travel and vehicle use on 437 miles of public-created routes added to the effects from ongoing and foreseeable road-related activities. None of the routes being constructed through those activities lie within riparian habitats. Cumulative effects for this alternative are similar to those described under direct and indirect effects.

Fire data from 1987-2008 show an average of 18,500 acres burn on the KNF each year (Isbell, personal communication). Wildfires can burn especially hot through riparian areas, seriously affecting vegetation, soil characteristics, and water flow. The potential effects from wildfire pose a higher threat to this species group than the effects of current off-road use on the Forest.

Alternative 2 – Proposed Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would end the impacts caused by cross-country travel on 7,220 acres and use of 98 miles of unauthorized routes within riparian habitats. The focal species would not be affected by disturbance and noise from vehicles, and potential impacts to individuals or habitat from cross-country vehicle travel. The effects of cross-country travel including collisions, displacement or avoidance, disturbance at a specific site, edge effects, habitat loss and fragmentation, and creation of routes for competitors or predators would be removed. Any changes that result in reduced motorized access could be viewed as beneficial for these species. In the long-term, passive restoration would occur on 54 miles of routes within riparian reserves, and 4.4 acres of riparian habitat would be expected to recover from soil and vegetation impacts caused by unmanaged motorized travel. This alternative is considered to be beneficial to the establishment and maintenance of riparian habitats compared to the current situation.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes adding 92 miles of roads and motorized trails to the NFTS, 44 miles within riparian reserves. Of this total, about 0.8 mile (1.6 acre) is within mapped riparian vegetation. Proposed routes are distributed across all six districts of the KNF. This alternative proposes to add 0.4 miles of routes within willow flycatcher habitat and 0.8 mile within red-legged frog and western pond turtle habitat.

The effects on riparian habitats in these routes have occurred; soil has been compacted and vegetation has already been affected. No additional impacts to riparian habitats or species are expected to occur from adding these routes to the NFTS. However, passive restoration of 1.6 acres of riparian habitat and 88 acres within riparian reserves will not occur in the long term due to continued vehicle use. This represents about one percent of habitat for tailed frog and long-tailed vole, and less than one percent of pond turtle, red-legged frog, and willow flycatcher habitat (Table 52).

Table 52. Alternative 2: Miles of routes within potential key habitat for the riparian group

Alternative 2	Miles of Routes Proposed within Riparian Habitats	Equivalent Acres in Riparian Habitats	Percent of Acres in Riparian Habitats / RRs Affected
Willow Flycatcher	0 .4	0.8	insignificant/ < 1%
Western Pond Turtle	0.8	1.6	insignificant/ < 1%
Northern Red-Legged Frog	0.8	1.6	insignificant/ < 1%
Tailed Frog/LT Vole	44[a]	88[b]	1.2 % / < 1%

a - Total miles within riparian reserves proposed for addition to NFTS
b - Equivalent acres for miles of routes within riparian reserves

Alternative 2 also proposes 65 acres within two designated areas that would be open to cross-country travel. These areas are not located within riparian habitats and will not affect riparian species.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not make any changes to season of use for routes within riparian habitats. Changes in class of vehicle use on NFTS roads will not affect riparian species or habitats.

Cumulative Effects

None of the routes being constructed through those activities lie within riparian habitats. Cumulative effects for this alternative are similar to those described under direct and indirect effects.

Alternative 3 – Cross-Country Travel Prohibition Only – No Changes to the Current NFTS

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group due to cessation of impacts caused by cross-country travel and used of unauthorized routes as described under alternative 1. See discussion under alternative 2 for beneficial effects.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative does not add facilities to the NFTS.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not make any changes to season of use.

Cumulative Effects

None of the routes being constructed through those activities lie within riparian habitats. Cumulative effects for this alternative are similar to those described under direct and indirect effects.

Alternative 4 – Maximize Quiet Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group by ending the impacts caused by cross-country travel and use of unauthorized routes as described under alternative 1. See discussion under alternative 2 for beneficial effects.

Direct and Indirect Effects of Adding Facilities to the NFTS

GIS queries indicate that proposed routes do not occur in riparian habitats but 0.3 mile of routes are proposed within riparian reserves. This equates to about 0.6 acre; effects to riparian species and habitats are not measurable and discountable under this alternative. Table 53 describes the miles of proposed routes within potential habitat for the riparian group.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not make any changes to season of use for routes within riparian habitats. Changes in class of vehicle use on NFTS roads will not affect riparian species or habitats.

Table 53. Alternative 4: Miles of routes within potential habitat for the riparian group

Alternative 5	Miles of Routes Proposed within Riparian Habitats	Equivalent Acres in Riparian Habitats	Percent of Acres in Riparian Habitats / RRs Affected
Willow Flycatcher	0.3	0.6	insignificant
Western Pond Turtle	0.3	0.6	insignificant
Northern Red-Legged Frog	0.3	0.6	insignificant
Tailed Frog / LT Vole	0.3	0.6	insignificant

Cumulative Effects

Effects from this proposal are almost identical to alternative 3.

Alternative 5 – Maximize Motorized Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Direct and indirect effects are similar to alternative 2.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes to about 23 miles of routes within riparian reserves to the NFTS; less than one mile (2 acres) is within mapped riparian vegetation. Proposed routes are distributed across all six districts of the KNF. This alternative proposes to add 0.4 mile within willow flycatcher habitat and 0.8 mile within

red-legged frog and western pond turtle habitat, and twenty-three miles within riparian reserves where tailed frogs and long-tailed voles could occur.

The effects on riparian habitats in these routes have occurred; soil has been compacted and vegetation has already been affected. No additional impacts to riparian habitats or species are expected to occur from adding these routes to the NFTS; however, passive restoration of 2 acres of riparian habitat and 46 acres within riparian reserves will not occur in the long term due to continued vehicle use. This represents about one percent of habitat for tailed frog and long-tailed vole, less than one percent of pond turtle and red-legged frog habitats, and less than two percent of willow flycatcher habitat (Table 56). No direct or indirect effects are expected from adding these routes to the NFTS. No loss of habitat is expected under this alternative for any species in the riparian group. Amounts of proposed routes overall represent over 70 percent reduction in miles occurring within habitats. Table 54 displays the mileage of proposed routes within habitats used by the focal species and the percent change from current condition.

Alternative 2 also proposes 53 acres within two designated areas that would be open to cross-country travel. These areas are not located within riparian habitats and will not affect riparian species.

Table 54. Alternative 5: Miles of routes within potential key habitat for the riparian group

Alternative 5	Miles of Routes Proposed within Riparian Habitats	Equivalent Acres in Riparian Habitats	Percent of Acres in Riparian Habitats / RRs Affected
Willow Flycatcher	0.4	0.8	Insignificant / < 1%
Western Pond Turtle	0.8	1.6	Insignificant / < 1%
Northern Red-Legged Frog	0.8	1.6	Insignificant / < 1%
Tailed Frog / LT Vole	23	46	0.25% / 0.5%

Effects of Changes in Existing Season and Class of Use

The proposed changes to season of use (Humbug area) do not affect riparian habitats.

Cumulative Effects

See cumulative effects for alternative 2. Insignificant differences exist between action alternatives for this species group.

Alternative 6 – Refined Proposed Action

Direct and Indirect Effects of the Prohibition of Cross-Country Travel

Effects are similar to those described under alternative 2.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes to add 59 miles of roads and motorized trails to the NFTS, 26 miles within riparian reserves. About 0.7 mile is within mapped riparian vegetation. The potential effects from these additions are similar to those described under alternative 5. The differences in effects between this and the other action alternatives for riparian habitats are minimal.

Alternative 2 also proposes 65 acres within two designated areas that would be open to cross-country travel. These areas are not located within riparian habitats and will not affect riparian species.

Table 55. Alternative 6: Miles of routes within potential key habitat for the riparian group

Alternative 6	Miles of Routes Proposed within Riparian Habitats	Equivalent Acres in Riparian Habitats	Percent of Acres in Riparian Habitats / RRs Affected
Willow Flycatcher	0.03	0.06	Insignificant / < 1%
Western Pond Turtle	0.7	1.4	Insignificant / < 1%
Northern Red-Legged Frog	0.7	1.4	Insignificant / < 1%
Tailed Frog / LT Vole	26[a]	52[b]	0.25% / 0.5%

a - Total miles within riparian reserves proposed for addition to NFTS
b - Equivalent acres for miles of routes within riparian reserves

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not make any changes to season of use for routes within riparian habitats. Changes in class of vehicle use on NFTS roads will not affect riparian species or habitats.

Cumulative Effects

See cumulative effects discussion for alternative 2. Insignificant differences exist between action alternatives for this species group.

Comparison of Effects on Riparian Species, by Alternative

The small differences of expected effects between action alternatives are essentially undetectable against the background fluctuations of weather and stochastic events (such as fires) which can also affect the riparian group. Significant beneficial effects to the riparian group from the action alternatives are clearly achieved by the prohibition of off-road use by reducing potential direct and indirect impacts on riparian species and their habitats. Passive restoration of existing routes would occur through time. Table 56 summarizes the change in metrics to the riparian group, by alternative.

Table 56. Comparison of selected habitat change metrics by alternative for selected riparian focal species

Species	Metric	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Willow Flycatcher Habitat (3,236 acres)	Habitat available for cross-country travel	7,220	0 acres	0 acres	0 acres	0 acres	0 acres
	Miles of unauthorized routes or proposed routes in habitat / Miles proposed within RRs	0.5 / 98	.4 / 44	0 / 0	0 / .3	.4 / 23	.03 / 26
	Equivalent acres of routes in RRs / % of KNF Habitat	196 ac / 6%	88 ac / 1.5%	No change	Insig.	46 ac / 0.5%	52 / 1.6%
Northern Red-Legged Frog and Western Pond Turtle Habitat (9,270 acres)	Habitat available for cross-country travel	7,220	0 acres	0 acres	0 acres	0 acres	0 acres
	Miles of unauthorized routes or proposed routes in habitat / Miles proposed within RRs	3 / 98	0.8 / 25	0 / 0	0 / 0.3	.8 / 23	0.7 / 26
	Equivalent acres of routes in RRs (% of KNF Habitat)[1]	196 ac / 2%	88 ac / 0.9%	0%	Insig.	46 ac / 0.5%	52 ac / .6%
Potential Tailed Frog and Long Tailed Vole Habitat (2500 miles of perennial and intermittent streams)	Habitat available for cross-country travel	1,800 miles	0 ac	0 ac	0 ac	0 ac	0 ac
	Miles of unauthorized routes or proposed routes in habitat	98 mi	25 mi	0	0.3 mi	23 mi	26 mi
	Percent of KNF potential habitat	3%	1%	0	Insig.	1%	1%

Cavity Dependent Species, Environmental Consequences by Alternative

Effects Common to All Alternatives (Focal species: white headed woodpecker, red-breasted sapsucker, Pileated woodpecker, and pallid bat)

No surveys have been conducted specifically for this project, and breeding locations are not known from other surveys, so habitat is assumed to be occupied. Species in this group could be affected by a wide variety of road and trail-associated factors including collisions, displacement or avoidance, disturbance at a specific sites, or habitat degradation.

Changing vehicle class or season of use does not affect snag habitat and should have limited effects on snag-dependent species. This indicator is not addressed in this section.

Alternative 1 – No Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative does not prohibit cross-country motorized travel. Of the approximately 508,000 acres that are available to off-road travel, about 102,700 acres can be considered habitat for cavity-dependent species. This is approximately 18 percent of the total suitable habitat for cavity-dependant species on the KNF. Cross-country travel in this habitat includes the use of 27 miles of unauthorized routes (54 acres). Although occasional direct mortality may occur from off-road collisions with vehicles, this type of occurrence has not been reported on the Forest for this species group. Such events are considered rare and are expected to be inconsequential to species population dynamics.

Table 57. Alternative 1: Miles of routes within potential habitat for the cavity-dependent group

Alternative 1	Total Acres of Suitable Habitat for Cavity-Dependant Species on the KNF	Acres Available for Off-Road Travel	Miles of Unauthorized Routes within Snag Dependent Species Habitat	Equivalent Acres / Percent of Total Habitat
Cavity-Dependent Habitat	612,000	102,700	27	42 / .007

A more likely occurrence would be disturbance from vehicle noise or physical intrusion that would cause individuals to move or alter behavior, particularly during foraging activities. Vehicle proximity may cause birds to flush from feeding locations. Disturbance could also impact food deliveries to cavities, pair-bonding, and cavity construction. Breeding-related impacts are less likely to occur, as early breeding activities may begin when snow impedes or prevents most cross-country travel.

Firewood cutters often take vehicles off roads to access down trees and snags. Continued off-road travel would potentially expose more area to firewood harvest. Snags are highly targeted as a source of firewood, and can be cut under permit in some areas on the Forest. This could potentially reduce the number of snags available for cavity-dependent species and affect the availability of future breeding and roosting sites. The highest potential for snag losses occurs on the Goosenest District where much of the land is accessible to off-road use because of the gentle terrain. **White-headed woodpeckers** are likely to be most vulnerable in this group. This species is common in the high elevation lodgepole and red fir communities and lodgepole pines are favored by local woodcutters (Blessing, personal communication). **Pileated woodpeckers** often forage near or on the ground (Bull and Jackson 1995) and thus may be susceptible to disturbance. But this species is more widespread on the west side of the Forest in steeper terrain that does not accommodate off-road use. Impacts to **red-breasted sapsuckers** may be minimal, compared to other cavity-dependent species, as they are commonly found in the widely distributed mid-mature mixed conifer stands found across the Forest. The **pallid bat** is sensitive to disturbance at roosting and breeding sites. It may be more vulnerable than others in this group because it is not active during the

day. It is associated with large snags that are also targeted by woodcutters, so direct impacts to roost trees could occur.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative does not add facilities to the NFTS.

Cumulative Effects

Cumulative effects include the impacts from continued cross-country travel and vehicle use on 27 miles of unauthorized routes added to the effects from ongoing and foreseeable road-related activities within snag habitat. Road-related activities will add 8 miles of ML 1 and 11 miles of ML 2 roads to the NFTS, and decommission sixteen miles of roads on the west side of the Forest.

Decommissioning roads would have positive long term beneficial effects as it eliminates the need to remove hazard trees from roadsides, so snags and dying trees would be left onsite. All other management activities are analyzed through separate, site-specific processes that apply LRMP standards and guidelines regarding the retention of snags. Standards call for maintenance of high capability snag habitat, with 2-5 snags per acre (calculated on a landscape basis).

Unpredictable yet foreseeable stochastic events such as wildfires or insect outbreaks are also likely to occur in the future. These events tend to create large numbers of snags both in pockets and scattered through the landscape. Fire data from 1987-2008 show an average of 18,500 acres burn on the KNF each year (Isbell, personal communication). Insect outbreaks are smaller in scale but also a common occurrence and part of the natural and dynamic system found on this landscape, typically occurring in higher elevation true fir stands. These activities and events have the potential to both positively and negatively impact cavity-dependent species by removing habitat elements while conversely, increasing snag recruitment levels.

Alternative 2 – Proposed Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative would benefit the focal species within this group by stopping the impacts caused by cross-country travel and used of unauthorized routes (described in alternative 1) on an estimated 102,700 acres of snag habitat. The focal species would not be affected by disturbance and the vehicular impacts to individuals from off-road use would not occur. Limiting access to snag habitat would potentially result in fewer snags being taken by woodcutters, which would be a beneficial effect over the long term.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes to add 9 miles of roads and trails to the NFTS that occur in habitats used by the cavity-dependent group. Some woodcutting could occur along these routes, and it is likely that in the long

term, some hazard trees will be removed that could have developed into snags. The vehicle traffic on this 9 miles likely presents little direct impact to any of the focal species in this group. Indirectly, more administrative routes would equal more area easily accessible for woodcutting, which typically happens in proximity to a roadway. Table 58 summarizes the miles of proposed routes relative to cavity dependent species habitat. Through time, trees available for snag recruitment would decrease along the roads. However, the effects of adding these miles to the NFTS are not significant given the quantity of habitat for cavity-dependent species Forestwide.

Two areas totaling 65 acres are proposed to be added for OHV travel. Cavity-dependent species habitats do not occur in these sites.

Table 58. Alternative 2: Miles of routes within potential habitat for the cavity-dependent group

Alternative 2	Miles of Proposed Routes within Snag Dependent Species Habitat	Equivalent Acres / Percent of Total Habitat
Cavity-Dependent Habitat	9	18 / .003%

Cumulative Effects

Cumulative effects include the impacts from continued cross-country travel and vehicle use on nine miles of public-created routes added to the effects from ongoing and foreseeable road-related activities. Road-related activities will add eight miles of ML 1 and eleven miles of ML 2 roads to the NFTS, and decommission sixteen miles of roads on the west side of the Forest. ML1 roads will not be open to the public, nor receive regular evaluation and treatment for hazard trees. A total of 20 miles of ML2 roads being added to the NFTS will be subject to removal of hazard trees through routine road maintenance. This potential loss is countered by the potential loss of thousands of snags on the 102,700 acres of snag habitat that will no longer be available to woodcutters.

Decommissioning roads would have positive long term beneficial effects as it eliminates the need to remove hazard trees from roadsides, so snags and dying trees would be left onsite. All other management activities are analyzed through separate, site-specific processes that apply LRMP standards and guidelines regarding the retention of snags. Standards call for maintenance of high capability snag habitat, with 2-5 snags per acre (calculated on a landscape basis).

Alternative 3 – Cross-Country Travel Prohibition Only – No Changes to the Current NFTS

Direst and Indirect Effects of the Prohibition of Cross-Country Travel

Direct and indirect effects of the prohibition of cross-country travel are described under alternative 2. This alternative would be entirely beneficial for the focal species within this group.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative does not add facilities to the NFTS.

Cumulative Effects

Cumulative effects are the combination of the prohibition of cross-country travel with ongoing and foreseeable road-related activities. Road-related activities will add eight miles of ML 1 and eleven miles of ML 2 roads to the NFTS, and decommission sixteen miles of roads on the west side of the Forest. Maintenance level 1 roads will not be open to the public, nor receive regular evaluation and treatment for hazard trees. A total of 11 miles of ML2 roads being added to the NFTS will be subject to removal of hazard trees through routine road maintenance. This potential loss is countered by the potential loss of thousands of snags on the 102,700 acres of snag habitat that will no longer be available to woodcutters.

Alternative 4 – Maximize Quiet Recreation Opportunities

Direct and Indirect Effects of the Prohibition of Cross-country Travel

This alternative would benefit the focal species within this group due to cessation of impacts caused by cross-country travel and use of unauthorized routes for woodcutting. See discussion under Alternative 2 for beneficial effects.

Direct and Indirect Effects of Adding Facilities to the NFTS

Alternative 4 would add about 0.2 mile to the NFTS within snag habitat (Table 59). Effects are similar in scope to alternative 3.

Table 59. Alternative 4: Miles of routes within potential habitat for the cavity-dependent group

Alternative 4	Miles of Proposed Routes within Cavity Dependent Species Habitat	Equivalent Acres / Percent of Total Habitat
Cavity Dependent Habitat	0.2	0.4 / insignificant

Cumulative Effects

Effects are virtually the same as for alternative 3.

Alternative 5 – Maximize Motorized Recreation Opportunities

Direct and Indirect Effects of the Prohibition of Cross-country Travel

Direct and indirect effects of the prohibition of cross-country travel are described under alternative 2.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes to add about 8.5 miles of routes within cavity-dependent species' habitat. Effects are nearly identical to those described in alternative 2.

Table 60. Alternative 5: Miles of routes within potential habitat for the snag dependent group

Alternative 5	Miles of Proposed Routes within Cavity Dependent Species Habitat	Equivalent Acres / Percent of Total Habitat
Cavity-Dependent Habitat	8.5	17 / .003%

Cumulative Effects

Effects of this alternative are similar in scope to alternative 2.

Alternative 6 – Refined Proposed Action

Direct and Indirect Effects of the Prohibition of Cross-country Travel

Direct and indirect effects of the prohibition of cross-country travel are described under alternative 2.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative would add 12 miles of roads and trails to the NFS that are in habitat for cavity-dependent species. Effects are similar to those described in alternative 2 (Table 61).

Table 61. Alternative 6: Miles of routes within potential key habitat for the cavity-dependent group

Alternative 6	Miles of Proposed Routes within Cavity-Dependent Species Habitat	Equivalent Acres / Percent of Total Habitat
Cavity-Dependent Habitat	12	24 / 0.004%

Cumulative Effects

Cumulative effects are the combination of the prohibition of cross-country travel with ongoing and foreseeable road-related activities. Road-related activities will add eight miles of ML 1 and eleven miles of ML 2 roads to the NFTS; and decommission sixteen miles of roads on the west side of the Forest. Management level 1 roads will not be open to the public, nor receive regular evaluation and treatment for hazard trees. A total of 11 miles of ML2 roads being added to the NFTS will be subject to removal of hazard trees through routine road maintenance. This potential loss is countered by the retention of thousands of snags on the 102,700 acres of snag habitat that will no longer be accessible to woodcutters.

Comparison of Effects on Cavity-Dependent Species, by Alternative

The changes in mileages among action alternatives result in undetectable changes to habitats, and effects to snag-dependent species are not measurable. Overall, the effects from added routes are insignificant when taken in context of the 102,000 acres of habitat on the Forest.

Alternative 1 has the highest potential for negative effects of the alternatives, but these effects are limited in scope and intensity in comparison to other actions occurring on the landscape. The aggregate effects adding mileage to the road system are dispersed across the Forest and do not represent a significant proportion of Forestwide habitat. Other large-scale events (such as wildfire) have a much higher potential for effects on this habitat type. Beneficial effects to cavity-dependent species would occur on 102,700 acres (18 percent of Forestwide habitat) by prohibiting off-road use. All action alternatives would result in significant reductions in the number of acres accessible to woodcutters. Alternative 1 shows the most impacts to cavity-dependent species and alternative 3 the least.

Table 62. Comparison of effects on cavity-dependent species, by alternative

Metric	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Miles of Unauthorized Routes or Routes Proposed for Addition	27	9	0	0.2	8.5	12
Equivalent Acres Affected	42	18	0	0.4	17	24
Percentage of Forestwide Habitat	0.007	0.003	n/a	Insignificant	0.003	0.004

Hardwood and Grassland/Sage Steppe Groups, Environmental Consequences by Alternative

The discussion of potential effects to these two focal groups is combined because both habitat types are similarly affected by cross-country travel. The discussion of effects is combined for alternatives 2-6 because the magnitude of change among the alternatives was small and the expected effects were similar among the action alternatives. Where differences exist among alternatives, they are discussed in each section.

Indicators: (1) Acres of habitat available for cross-country travel; (2) Miles of unauthorized routes (alternative 1), or roads and trails proposed for addition to the NFTS (action alternatives) within identified habitats.

Hardwood Group (Focal species: western grey squirrel, acorn woodpecker)

California black oak and Oregon white oaks are important vegetation types and habitat components for this group because they provide an abundant and high quality food resource. Mature oaks are also an important source of cavities that provide nesting and roosting habitat. Vegetation management projects

leave hardwoods as leave trees whenever possible. Pure stands of hardwoods are not intended to be managed as part of the timber component. Surveys specifically for this project have not been conducted, and breeding locations are not known, so projected effects rely on reference material or are habitat-based. Approximately 63,100 acres of hardwood habitats are estimated to occur on the KNF.

Grassland/Sage Steppe (Focal species: pronghorn, burrowing owl, Swainson's hawk)

The grassland/sage-steppe group is found primarily on the Butte Valley Natural Grasslands (BVNG) on the Goosenest district. Farming, grazing, and flood control projects in the early part of this century dramatically altered the historical perennial grasslands, seasonal wetlands, and open sagebrush-steppe vegetation. However, some restoration of these habitats has occurred over the last twenty years with the habitat management projects in some areas of the BVNG and the adjacent state-owned Butte Valley Wildlife Area. About 10,610 acres of grassland-sage/steppe habitats occur on the east side of the Forest, of which about 2,750 acres are pronghorn kidding habitat. Ten breeding Swainson's hawk territories are known to occur on the Klamath NF in the sage-steppe habitat (Cheyne, personal communication). Intermittent surveys for burrowing owls have occurred over the last ten years, but no sightings at the six historic colonies in Butte Valley have occurred since 1996 (Cheyne, personal communication). Potential effects are measured in terms of habitat and proximity to known sites (including historic sites for burrowing owls).

Alternative 1 – No Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative does not prohibit cross-country travel.

Direct and indirect effects to grassland/sage steppe and hardwood habitats include soil compaction from vehicle use, edge effects from route proliferation, continued disturbance; long term degradation of habitat quality; and introduction of invasive species. Impacts to individuals include direct mortality, displacement or avoidance, and disturbance from noise or vehicle intrusion. Motorized use of unauthorized routes during the breeding season could result in decreased reproductive success such as nest abandonment or injury to young.

Hardwoods: This alternative presents the highest route mileage and amount of habitat exposed to cross-country travel. Vehicle-caused mortality of western grey squirrels and acorn woodpeckers is not uncommon along highways, but is unlikely to occur from slower moving off-road vehicles. The vast majority of hardwood stands occur on the west side of the Forest where steep slopes limit cross-country travel, so direct impact to individuals in this group is likely very low. Disturbance to hardwood associated species' activities could occur along edges of unauthorized routes. Vehicle travel may disrupt foraging activities, resulting in more energy expenditures. In the long term, off-road travel in hardwood habitats could result in less available habitat for foraging and reproduction, especially over the long term as routes

continue to proliferate. Approximately 9,200 acres, or 15 percent, of the total habitat on the Forest is estimated as accessible to off-road travel (Table 65).

Grassland/sage-steppe: Cross-country vehicle use during the breeding season could result in injury or mortality to individuals, or decreased reproductive success such as nest abandonment or injury to young. All 10,600 acres of grassland/sage steppe habitat is available to cross-country travel because of the gentle terrain, including 2,750 acres designated as pronghorn kidding area. Eight known Swainson's hawk nest sites and two of the historic burrowing owl colonies occur within 0.25 mile of unauthorized routes. LRMP standard and guideline 8-37 requires a restriction of activities within 0.25 mile of active Swainson's hawk nests during the nesting season (April 15 to August 15). Because the LRMP does not control cross-country travel, there is currently, no restriction in place, but productivity at these nests does not appear to have been affected (Cheyne, pers.comm). This is perhaps because the birds have adapted to the regular vehicle use associated with these routes.

The highest risk of habitat degradation and/or disturbance to the grassland/sage-steppe is from cross-country travel. Direct impacts to adult Swainson's hawks are unlikely to occur, but young in the nest can jump off nests if disturbed, potentially being run over or injured. Burrowing owl nest sites are not obvious to most people and are very vulnerable to destruction from vehicles traveling off-road. Young pronghorn remain motionless for long periods as part of ungulate "hider" strategy and can be run over by vehicles traveling cross-country. This is most likely to occur on the 2,750 acres of pronghorn kidding habitat.

With no controls or opportunities for mitigations, negative impacts to hardwood and grassland habitats would be expected to occur through the short and long term. In the long term, passive restoration of about 20 acres of hardwood habitat and 58 acres of grassland habitat would not occur due to continued vehicle use. Vehicle travel off designated NFS roads and on user-created routes would continue and routes would likely proliferate. Disturbance to individuals would continue to occur on 9,280 acres of hardwood habitat and 10,600 acres of grasslands. The actual extent to which these groups are affected as a result of implementing this alternative cannot be quantitatively assessed because of the unknown potential for expansion of the user created route system, and the timing and duration of the activities. With no controls or opportunities for mitigations, negative impacts to this group could continue to occur through the short and long term.

Table 63. Alternative 1: Miles of routes within potential key habitat for the hardwood and grassland/sage-steppe group

Alternative 1	Total Habitat Forestwide	Acres of Suitable Habitat Open to OHV	Miles of Unauthorized Routes within Habitats	Equivalent Acres	Percent of Total Habitat[a]
Hardwoods	63,100	9,280	10	20	0.3%
Grassland/ Sage-steppe	10,600	10,600	29	58	0.5%

a - Percent of total habitat contained within identified unauthorized routes.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative does not add facilities to the NFTS.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not propose changes to existing season of use or vehicle class.

Cumulative Effects

None of the ongoing or foreseeable road-related actions propose to add road mileage in grassland or hardwood habitats. For both groups, cumulative effects would be the same as those described for direct and indirect effects.

Alternative 2 - 6 – Action Alternatives (Prohibition of cross-country travel and adding routes to NFTS)

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The action alternatives would significantly benefit the focal species within these groups and their habitat in the short and long term by ending the impacts caused by cross-country travel and use of unauthorized routes on the acres as described in alternative 1. The focal species would not be affected by disturbance and the vehicular impacts to individuals or habitat from cross-country vehicle travel on the approximately 10,000 acres of these habitats currently available. Any changes that reduce disturbance could be viewed as beneficial for these species. In the long-term, unauthorized routes not added to the NFTS would be expected to passively recover from soil and vegetation impacts caused by motorized travel.

Direct and Indirect Effects of Adding Facilities to the NFTS

These alternatives propose adding 0-6 miles of roads and motorized trails to the NFTS in the grassland and hardwood habitat types. This would affect at most the equivalent of 8 acres of hardwood habitat, and 12 acres of grassland habitat. All of these figures represent significant reductions from the 10-29 miles (20-58 acres) of unauthorized routes that currently exist.

One proposed route (8Q002.3) is within 100 meters of two Swainson's hawk nests. A seasonal restriction (April 15 - August 15) is proposed for this route, which will minimize disturbance to these nests during breeding season. All other proposed routes are outside of pronghorn habitats and are further than 0.25 mile of historic burrowing owl sites or Swainson's hawk nests. The impacts of adding roads and motorized trails to the NFTS in the grassland and hardwood habitats are considered to be imperceptible, and would not affect existing trends to species population size, habitat or distribution for species in this group.

The action alternatives propose adding two designated areas that would be open to cross-country travel. These areas are not located within hardwood or grassland/sage steppe habitats and will not affect these species.

Table 64. Comparison of selected habitat change metrics by alternative for hardwood and grassland sage-step species

Species	Metric	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Hardwood Habitats (63,100 ac)	KNF habitat available for cross-country travel[a] / percent of Forest habitat (Alt 1)	9,280 / 14%	0	0	0	0	0
	Miles of routes in habitat[a]	10	3	0	0	4	3
	Equivalent acres of routes in habitat	20	6	0	0	8	6
Grassland Sage Steppe Habitats (10,600 ac)	KNF habitat available for cross-country travel[a] / percent of Forest habitat (Alt 1)	10,600 / 100%	0	0	0	0	0
	Miles of routes in habitat	29	4	0	0.4	6	4
	Equivalent acres of routes in habitat	58	8	0	0.8	12	8

a - Miles of unauthorized routes that could continue to receive motorized use under continued cross-country travel (Alt 1); miles of roads and motorized trails added to the NFTS and equivalent acres (all other alternatives)

Direct and Indirect Effects of Changes in Existing Season and Class of Use

The only proposal to change season of use would be implementation of a restricted season on one road that is within 0.25 mile of two Swainson's hawk nests. Although the nests have been productive in the past, application of the season of use will reduce disturbance to these two nests.

Cumulative Effects

None of the ongoing or foreseeable road-related actions would add road mileage in grassland or hardwood habitats. For both groups, cumulative effects would be the same as those described for direct and indirect effects.

Wide Ranging Carnivores – (Focal species: Black Bear[3])

The black bear is identified as a special emphasis species that occurs throughout the Forest and utilizes a variety of habitats and seral stages. Bears den and rest in mature, dense forested habitats which provide snags, stumps, uprooted trees, or large hollow tree cavities. Early successional vegetation communities provide a primary source of food for this omnivorous species. Effects to these late successional habitats are discussed in the late-successional group as well as in the cavity-dependent species section. About 612,000 mature/late successional habitats occur on the Forest in addition to 295,500 acres of early successional habitats that may be used by bears. Combined, about 252,800 acres are considered to be available for cross-country travel. A total of 94 miles of unauthorized routes occur within these habitats.

The discussion of effects is combined for alternatives 2-6 because the magnitude of change between the alternatives was small and the expected effects were similar between the action alternatives. Where differences exist between alternatives, they are discussed in each section.

Indicators: (1) Acres of habitat available for off-road travel; (2) Miles of unauthorized routes within terrestrial wildlife habitat.

Alternative 1 – No Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

This alternative does not prohibit cross-country motorized travel.

Black bears could be affected by a wide variety of road and trail-associated factors including displacement or avoidance, disturbance at a specific sites, or habitat degradation. This alternative presents the highest route mileage and habitat exposed to off-road travel. KNF Management guideline 8-44 states that the Forest manage "open" road densities to reduce the level of human interaction with bears during critical times of the year. The reduction in unauthorized routes will contribute to this guideline by prohibiting unauthorized use. The LRMP Black Bear Habitat Capability Model indicates that road densities exceeding 1.5 mile per square mile meets “low” capability. (See Table 21, Changes to Route Density in 7th Field Watersheds with Proposed Additions in the Hydrology section). Many 7th field watersheds on the Forest currently exceed this density. Direct impacts of vehicles and bears are not common along highways, and are even more unlikely to occur as a result of slower moving off-road vehicles. Black bears are more common on the west side of the Forest where topography is not as amenable to cross-country travel, so the probability of direct impacts to bears is almost non-existent. Disturbance to foraging activities could occur along edges of unauthorized routes, both in the short term and long term. Cross-country travel could impact black bear food sources such as berries and invertebrates by changing soil conditions and trampling of plants, down logs or insect nests. Indirect habitat degradation could occur primarily through disturbance, and potential proliferation of trails in the

[3] Wolverine is a wide-ranging carnivore; it is addressed in the Late Successional group due to its affinity for these habitats.

long term. Although black bears are known to habituate to human presence like large campgrounds, bears are generally wary and susceptible to noise disturbance on the KNF. This may be because of the remote nature of this Forest, and possibly due to hunting pressure.

Approximately 94 miles of routes (188 acres) occur within habitats for black bears, less than 0.01 percent of the total available habitat. The area within the unauthorized routes has already been subjected to soil compaction and loss of vegetation. These acres will not passively recover in the long term due to continued vehicle use. The greatest potential for effects would come from proliferation of routes in bear habitat, which is not a serious threat due to the steep topography. Table 65 displays the miles of routes within potential habitats for the wide-ranging carnivore group for alternative 1.

Table 65. Alternative 1: Miles of routes within potential key habitat for the wide-ranging carnivore

Alternative 1	Total Habitat Forestwide	Acres of Suitable Habitat Open to OHV	Miles Unauthorized Routes within Habitats	Equivalent Acres	Percent of Total Habitat
Black Bear	907,500	252,800	94	188	< 0.01

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative does not add facilities to the NFTS.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not propose changes to existing season of use or vehicle class.

Cumulative Effects

Cumulative effects to black bears are the combined effects from the continued use of 94 miles of user-created routes and continued cross-country travel by motorized vehicles on over 250,000 acres of habitat combined with ongoing and foreseeable road-related activities. Road-related activities will add eight miles of ML 1 and eleven miles of ML 2 roads to the NFTS, and decommission 16 miles of roads on the west side of the Forest. With the exception of a short (0.2 mile) spur, new roads are all located on the Goosenest Ranger District, which contains relatively little bear habitat. Approximately 3 miles along six road segments are proposed to be added for the Goosenest Late Successional Reserve Habitat Restoration Project. Short term effects to habitat will occur, but the project is designed to provide long-term benefits to LS habitat. Decommissioning 16 miles of road within bear habitats will reduce disturbance associated with vehicle use; this is considered a beneficial effect.

Alternative 2 - 6 – Action Alternatives

Direct and Indirect Effects of the Prohibition of Cross-country Travel

This alternative would benefit the black bear habitat in the short and long term by ending the impacts caused by cross-country travel on 252,800 acres of black bear habitat. Any changes that reduce accessibility and disturbance could be viewed as beneficial for these species. In the long-term, routes that are not added to the NFTS will passively recover from soil and vegetation impacts caused by motorized travel. Any of the action alternatives represent a beneficial effect for black bears over the current situation.

Direct and Indirect Effects of Adding Facilities to the NFTS

These alternatives propose adding 1-32 miles of roads and motorized trails to the NFTS in early successional habitats (Table 66). All of these figures represent a significant reduction from the 94 miles of unauthorized routes that currently exist. The routes proposed for designation under these alternatives exist and are being used; soils are already compacted and changes to vegetation within the routes have occurred. Adding the routes to the NFTS will not change these conditions. There is little difference in the scope of potential effects among alternative 2, 5, and 6. At most, the addition of routes to the NFTS would represent the equivalent of 0.007 percent of the Forestwide habitat available to black bears. The proposed routes are distributed across the Forest, many as very short spurs to access dispersed recreation sites. Because of this wide distribution, there would be no significant increase in road densities in any key black bear foraging habitat.

Three acres of early successional habitat lie within the Humbug OHV area, which represents an insignificant proportion of black bear habitat. This area has been used year-round by recreationists for many years. If bears do occur in the Humbug drainage, they likely have learned to avoid this area. Suitable habitat does not occur in the Juniper Flat OHV area. Humbug and Juniper Flat are not identified as key use areas for black bears.

Table 66. Comparison of selected habitat change metrics by alternative for wide-ranging carnivores (black bear)

Species	Metric	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Black Bear Habitat (907,500 ac)	KNF habitat available for cross-country travel	252,800	0	0	0	0	0
	Miles of routes in habitat	94	28	0	1	26	32
	Equivalent acres of routes in habitat	188	56	No change	2	52	64

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No direct or indirect effects are expected to occur due to changing season of use or class of vehicle.

Cumulative Effects

Cumulative effects to black bears are the combined effects from the continued use of 1-32 miles of user-created routes combined with ongoing and foreseeable road-related activities. Road-related activities will add eight miles of ML 1 and eleven miles of ML 2 roads to the NFTS, and decommission 16 miles of roads on the west side of the Forest. These activities will have minimal impact on black bears or their habitats (see discussion under alternative 1). Any negative effects associated with the action alternatives are considered to be imperceptible and discountable because of the scattered locations of these roads and the wide-scale distribution and quantity of suitable habitat to the black bear. The negative impacts that might occur under these alternatives are countered by the benefits of prohibiting cross-country motorized travel.

Compliance with the Forest Plan and Other Direction

All the alternatives comply with standards and guidelines found in the LRMP. Due to the continuation of cross-country travel, alternative 1 would have the highest likelihood of effects to wildlife species.

In accordance with the Endangered Species Act of 1973, as amended, a Biological Assessment/Biological Evaluation (BE/BE) was prepared for the Klamath National Forest Motorized Travel Management Project. The BA/BE is incorporated by reference and may be found in the project files. The Biological Assessment was based on alternative 5, which represents the maximum motorized mileage proposed and acres of OHV use areas added to the NFTS, and therefore has the greatest potential impacts of all alternatives. A summary of determinations for the various species analyzed follows.

Threatened and Endangered Species

Northern Spotted Owl

Cross-country travel allowed in alternative 1 may affect individual spotted owls through degradation of foraging habitat, and disturbance near nest or roost sites. The likelihood of disturbance-based effects is low based on where owls nest and roost on the landscape, the Klamath's terrain, and the limited and dispersed use of cross-country travel. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. Alternatives 2, 4, 5 and 6 propose only an administrative change to a small number of existing routes which will not affect habitat. Noise disturbances on those routes are not expected to exceed the ambient levels. Proposed routes are spread across the forest and will not result in noise disturbance exceeding ambient conditions.

Determination: Alternative 1 may affect northern spotted owls but is not likely to adversely affect. There will be no effect to critical habitat. Alternatives 2-6 will have no effect on northern spotted owls or their critical habitat.

Marbled Murrelet

Cross-country travel allowed in alternative 1 is highly unlikely to occur within or adjacent to suitable murrelet habitat due the extremely rugged terrain of the western-most portion of the Forest. Alternative 1 allows continued use of 16 miles of unauthorized routes within 0.25 mile of murrelet habitat, but use on these routes likely will not exceed noise levels typical of the existing NFTS roads. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. Alternatives 2, 4, 5 and 6 propose only an administrative change to a small number of existing routes which will not affect habitat. No known nest sites occur on the Klamath National Forest, and there will be no loss of or effects to critical habitat.

Determination: Alternative 1 may affect marbled murrelets but is not likely to adversely affect. Alternatives 2-6 will have no effect on marbled murrelets or their critical habitat.

Tidewater Goby

Suitable habitat does not occur on the KNF. None of the alternatives will produce direct or indirect effects on this species.

Determination: There will be no effect to Tidewater Goby or its critical habitat from alternatives 1-6.

Western yellow-billed cuckoo

Habitat for this species does not occur on the KNF.

Determination: Alternatives 1-6 will have effect on the western yellow-billed cuckoo.

Vernal Pool Fairy Shrimp

There are no known locations of vernal pool fairy shrimp on the Forest; however, small amounts of potentially suitable habitat do occur in grasslands on the east side of the Forest. Alternative 1 could result in off-road use occurring in potentially suitable habitat, but the likelihood is low as habitat is very limited. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. Alternatives 2, 4, 5 and 6 would affect at the most 12 acres of grassland habitat which are not known to support vernal pools.

Determination: Alternative 1 may effect but is not likely to adversely affect. Alternatives 2-6 will have no effect on vernal pool fairy shrimp. There is no critical habitat for vernal pool fairy shrimp on the Forest; the proposed activities will not affect critical habitat.

Mardon Skipper

There are no known locations of Mardon skippers on the Forest, though potentially suitable habitat does occur in meadows and grassland. Alternative 1 could affect this species from cross-country travel in meadows. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. Alternatives 2, 4, 5 and 6 propose to add no more than 0.6 mile (1.2 acre) of routes within riparian habitats, most of which is not meadow.

Determination: Alternative 1 may effect but is not likely to adversely affect; Alternatives 2-6 will have no effect on Mardon skipper.

Forest Service Sensitive Species

Marten

Alternative 1 may affect individual martens as cross-country travel could disturb or disrupt breeding and reproductive activities, or directly affect foraging habitat through creation of new routes. OHV use is light and dispersed over the Forest, but is more likely to occur on the Goosenest District due to the flatter terrain. No den sites are known on the Forest, but there are many confirmed observations of marten, particularly on the Goosenest District. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. Proposed routes in alternatives 2, 4, 5 and 6 are dispersed across the Forest and insignificant in number. The addition of these routes does not appreciably affect road density, nor does it result in increases in noise or disturbance above current levels. The potential for effects to pacific fisher is so low and discountable that it is essentially the same as no effect for any of the alternatives in this project.

Determination: Alternatives 2-6 would not affect American marten or its habitat. Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the American marten.

Pacific Fisher

Alternative 1 may affect individual fishers as cross-country travel could disturb or disrupt breeding and reproductive activities, or directly affect foraging habitat through creation of new routes. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. The

road, trail and area additions proposed in alternatives 2, 4, 5 and 6 are dispersed across the Forest, do not appreciably affect road densities, and would not result in noise that exceeds current levels, so adverse effects are not expected. The potential for effects to pacific fisher is so low that it is essentially the same as no effect for any of the alternatives in this project.

Determination: Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the fisher. Alternatives 2-6 would not affect the Pacific fisher.

California Wolverine

Wolverine are extremely rare on the KNF. Alternative 1 could affect individual wolverines as cross-country travel could disturb or disrupt breeding and reproductive activities, or directly affect foraging habitat through creation of new routes. There have been no confirmed sightings of wolverines on the Goosenest District where OHV use is most likely to occur. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. Proposed routes in alternatives 2, 4, 5 and 6 are dispersed across the Forest and insignificant in number. The addition of these routes does not result in increases in noise or disturbance above current levels. There would be no effect to habitat or individuals under alternatives 2-6.

Determination: Alternatives 2-6 would not affect the California wolverine. Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the wolverine.

Sierra Nevada Red Fox

This fox is not known to occur on the KNF, but suitable habitat does occur, likely associated with meadows and openings within or adjacent to late-successional habitats. Alternative 1 may affect individual Sierra Nevada Red Fox as cross-country travel could disturb or disrupt breeding and reproductive activities, or directly affect foraging habitat through creation of new routes. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. Proposed routes in alternatives 2, 4, 5 and 6 are dispersed across the Forest and insignificant in number. The addition of these routes does not result in increases in noise or disturbance above current levels. There would be no effect to habitat or individuals under alternatives 2-6.

Determination: Alternatives 2-6 would not affect the Sierra Nevada red fox; Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the Sierra Nevada red fox.

Northern Goshawk

Under alternative 1, approximately nine miles of unauthorized routes occur within 0.25 mile of thirteen known sites. Vehicle noise is not expected to increase above current levels, but any vehicle traveling beneath nest sites could disturb adults or young. All action alternatives eliminate cross-country travel, significantly reducing potential impacts from noise and physical disturbance, and reducing the potential for loss of habitat through creation of new routes. All action alternatives result in less effect than the current situation. There would be no effect to habitat or individuals under alternatives 2-6.

Determination: Alternative 1 may affect individual goshawks as cross-country travel could contribute disturbance or direct effects to foraging habitat, or breeding and reproductive activities. Alternatives 2-6 would not affect goshawks.

Great Grey Owl

Nesting GGOs are not known to occur on the KNF, though potentially suitable habitat does occur. Alternative 1 could affect individual owls as cross-country travel could disturb or disrupt breeding and reproductive activities, or directly affect foraging habitat through creation of new routes. Alternative 3 would beneficial impacts as motorized cross-country vehicle travel would be prohibited and no additional routes would be added to the NFTS. Alternatives 2, 4, 5, and 6 would prohibit cross-country motorized vehicle travel, significantly reducing potential effects from the current situation. There would be no effect to habitat or individuals under alternatives 2-6.

Determination: Alternatives 2-6 would not affect the GGO. Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the GGO.

Siskiyou/Scott Bar Salamander, Blue Grey Tail Dropper, and Tehama Chaparral Snail

Due to the limited occurrence and/or the subterranean life history of these species, it is highly unlikely they would be affected by current off-road use under alternative 1. These species are found beneath the surface for the majority of the year, and are unlikely to be disturbed by noise or vehicle activity. They are most likely to be near the surface when conditions are wet or just after snow has melted, which is not the time of year when vehicles generally are traveling off roads. There should be no effects on individuals or habitats under the action alternatives.

Determination: Alternatives 2-6 would not affect the Siskiyou/Scott Bar salamander, blue grey tail dropper, or Tehama chaparral snail. Alternative 1 could affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for any of these species.

Foothill Yellow-Legged Frog, Southern Torrent Salamander, Sandhill Crane, Willow Flycatcher, Western Pond Turtle, and Cascades Frog

Alternative 1 may affect these riparian-dependant species as cross-country travel could result in direct and indirect effects to aquatic habitats and riparian vegetation, thereby potentially affecting breeding and reproductive activities, or the upland habitats used in the non-breeding seasons. All these species are either wide ranging and/or impacts that could occur represent an insignificant proportion of known habitat on the KNF. Alternative 3 would have no impact as motorized cross-country vehicle travel would be prohibited and no additional routes would be added to the NFTS. Alternatives 2, 4, 5, and 6 would also prohibit cross-country motorized vehicle use, significantly reducing the potential for effects from route proliferation. Less than one mile of routes is proposed within habitat for these species; impacts to the affected areas have already occurred and are not considered to be a significant proportion of existing riparian habitat.

Determination: Alternatives 2-6 would not affect the above listed riparian-dependant species. Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the foothill yellow-legged frog, sandhill crane, willow flycatcher, western pond turtle, and Cascades Frog.

Bald Eagle

This is a very wide-ranging species throughout North America. Alternative 1 may affect the bald eagle as cross-country travel could result in direct and indirect effects to nesting pairs, foraging habitats, or roost sites, thereby potentially affecting breeding and reproductive activities, or wintering birds. Alternative 3 would have a beneficial impact on eagles as motorized cross-country vehicle travel would be prohibited and no additional routes would be added to the NFTS. Alternatives 2, 4, 5, and 6 would also prohibit cross-country motorized vehicle use, and do not propose routes occurring within 0.25 mile of known nest or roost sites.

Determination: Alternatives 2-6 would not affect the bald eagle. Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability.

Swainson's Hawk

Alternative 1 may affect the Swainson's hawk as cross-country travel could result in direct and indirect effects to nesting pairs, young, foraging habitats, or roost sites, thereby potentially affecting foraging, breeding, and reproductive activities. Alternative 3 would have a beneficial impact on Swainson's hawks as motorized cross-country vehicle travel would be prohibited and no additional routes would be added to the NFTS. Alternatives 2, 4, 5, and 6 would also prohibit cross-country motorized vehicle use, and seasonal restrictions would ensure these proposed route additions would not affect known nest sites.

Determination: Alternative 1-6 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability.

Pallid Bat

This species is known to occupy a variety of habitat types, but is frequently associated with large snags found in late-successional habitats. Alternative 1 may affect individual pallid bats as cross-country travel could disturb breeding and reproductive activities. Disturbance to foraging activities is unlikely to occur due to bats' crepuscular and nocturnal habits. Much of the late-successional habitat is found on the west side of the Forest, where topography limits off-road travel. Alternative 3 would have a beneficial impact on pallid bats as motorized cross-country vehicle travel would be prohibited and no additional routes would be added to the NFTS. Alternatives 2, 4, 5, and 6 would also prohibit cross-country motorized vehicle travel but would add fewer than five miles of routes within habitat or adjacent to habitat to the NFTS. These route additions are dispersed across the Forest, are insignificant in number, and would not result in noise that exceeds ambient levels. The potential for effects to the pallid bat is so low and discountable that it is essentially the same as no effect for any of the alternatives in this project.

Determination: Alternatives 2-6 would not affect the pallid bat. Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability.

Townsend's Big-eared Bat

This species is strongly associated with cave systems and large rock outcroppings. One unregulated off-road use area occurs within about 0.7 mile of a known population. This area has been receiving high use for several years and the amount of noise generated by OHV riders is expected to continue. Without regulation, alternative 1 could result in OHV riders approaching and disturbing the bat colony. Alternative 3 would prohibit cross-country travel and discourage motorized approach to the colony. Alternatives 2, 5, and 6 include the establishment of an off-road use area, but include mitigations that would significantly reduce the likelihood of physical disturbance to the colony. Direct impacts to habitat are not expected under the action alternatives.

Determination: Alternatives 2-6 would not affect the Townsend's Big-eared bat. Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability.

3.12 Cultural Resources

3.12.1 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 (NHPA) (16 U.S.C. 470-1(3)). This need was made more explicit when the National Historic Preservation Act 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 can not be repaired or replaced. The term "historic properties" is used interchangeably with "cultural resources" or "cultural resource sites" throughout this document. The former has a more specific definition according to the NHPA, but the two are used synonymously here as a literary convenience to reduce repetition.

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 is 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 lands (36 CFR 212.55(a), 212.55(b)(1)).

3.12.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant and specific to the proposed action 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 National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.) (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 National Historic Preservation Act of 1966 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) implements NHPA Section 106. NHPA Section 110 sets

inventory, nomination, protection, and preservation responsibilities for Federally-owned historic properties.

The Forest Service's 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 (2005). This policy was developed in consultation with the Advisory Council on Historic Preservation. It outlines minimal requirements for considering possible effects to historic properties that may be associated with designating routes and areas as part of a national forest's transportation system. This policy statement recognizes that forests with programmatic agreements for compliance with Section 106 of the NHPA will follow the terms of those agreements.

Section 106 of the NHPA and the ACHPs implementing regulations, Protection of Historic Properties (36 CFR Part 800), require that federal agencies take into account the effect of their undertakings on historic properties, and that agencies provide the ACHP with an opportunity to comment on those undertakings. The Klamath National Forest is situated on the Oregon and California border. Programmatic agreements (36 CFR 800.14(b)) provide alternative procedures for complying with 36 CFR 800. Region 5 has such an agreement: Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, U.S.D.A. 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 Forest Service 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. There are no programmatic agreements in place for the state of Oregon.

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 National Register of Historic Places 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.

The Klamath National Forest Land and Resource Management Plan (USDA Forest Service 1995) (LRMP) outlines the minimum conditions that will be retained throughout the Forest in order to ensure resource protection and enhancement. The LRMP specifically lists the following standards and guidelines, management area specifications, and the minimum resource conditions necessary to protect cultural resources identified.

- 24-3: "Conduct a cultural resource survey before all ground-disturbing activities in compliance with applicable Federal historic preservation legislation (FSM 2360). In addition, surveys and applicable site evaluations should be completed before a Record of Decision or Decision Notice is signed. Document the results of project-level cultural resource inventories in the cultural resources report".
- 2-10: "Surveys are expected to be adequate to identify cultural sites. All identified cultural sites will be avoided until a determination of significance can be made".
- 24-7: "Consider the effects of all Forest Service undertakings on significant cultural resources. Develop measures to avoid or mitigate any adverse effects. Give priority to those properties that may be affected by project activities".
- 24-14: "Maintain significant and eligible historic sites and mitigate any adverse effects. Stabilization or rehabilitation may be carried out for significant sites that have been damaged. Decisions on the maintenance level for eligible historic structures should be based on an analysis of utility, interpretive values, public interest, existing site or area allocation, funding sources and levels, existing agreement, and other relevant considerations. Maintain any cultural materials removed from their Forest setting in a professional manner".
- 24-15: "Suitable cultural resource properties may be interpreted for the recreational use and educational benefit of the public. The measure of suitability should be based on accessibility to the public, feasibility for protection, condition of the property, compatibility with other resource management activities within or next to the area, thematic representation and value to public groups. Interpretive services and facilities should be compatible with the nature, qualities and integrity of the cultural sites selected for enhancement. Preferred methods include brochures, signs, displays, interpretive trails, tours and video or slide programs".
- 24-16: "Interpret significant cultural resources for visitor use, information and enjoyment".
- 24-17: "Monitor mitigation measures established during the environmental analysis of a given project to insure all stipulations are being met. Current records are necessary to indicate compliance with legal mandates. Tracking of the mitigation plan is necessary during and following ground-disturbing activities where cultural resource values are present".
- 2-11: "Restrict off-highway vehicle (OHV) use to protect key resource values and meet management directives".
- 3-20: "…[L]ocal Native American tribes and State Historic Preservation Office (SHPO) are consulted on Forest project proposals requiring environmental analysis".

- 24-21: "Coordinate management of traditional religious sites with Native American groups. Present information about planned project activities to American Indian groups for coordination concerning effects on traditional religious sites.
- 24-22: "Management practices may be modified or restricted to provide for protection of the spiritual and religious aspects of designated areas. Additional special actions may be taken at the time of ceremonies to permit their un-encumbered performance".
- 24-23: "Identify opportunities for the Forest to coordinate resource activities compatible with interests of surrounding Native American tribes".
- 24-24: "Provide for Native American needs for collection and/or use of traditional resources".
- 24-25: "Protect traditional Native American rights and practices (Public Law (PL) 95-341) to insure the integrity of the site and to assure that use will continue to occur and will not be impaired".

Management Area 8 – Cultural Areas

- MA8: "Provide protection of the ceremonial values that exist in these areas" and to "Manage to preserve and protect the solitude and privacy of Native American users".
- MA8-3 (S&G): "Coordinate planned Forest management activities for areas immediately next to cultural areas with the [Karuk] tribe.
- Determine if the activities would affect ceremonies occurring within the cultural area. Mitigation measures should be used to avoid conflicts with ceremonial activities".
- MA8-5 (S&G): "Do not direct recreational use to Native American cultural areas. River-related recreational use will be managed to minimize conflicts".
- MA8-6 (S&G): "Developed recreational activities shall not be planned within cultural areas".
- MA8-7 (S&G): "Manage recreational settings to generally achieve semi-primitive or roaded natural ROS conditions".

3.12.3 Effects Analysis Methodology

Assumptions specific to analysis

- Unauthorized routes and areas have already affected historic properties within route/area prisms.
- 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.

- There is no measurable difference in potential impact to cultural resources, given identical environmental variables, between that generated by different vehicle classes, i.e., full size four wheel drive vehicles, off-road vehicles, and motorcycles.
- According to the Motorized Recreation PA, 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 SHPO or through other agreed on procedures (36 CFR §60.4; 36 CFR §800).
- The Klamath National Forest has consulted with the Oregon SHPO. The Oregon SHPO concurred with the Forest's determination of "no effect" for the proposed Travel Management undertaking on March 24, 2009.
- The Klamath National Forest will develop and consult upon a Monitoring Plan to determine long term effects on sites located within the APE.

3.12.4 Data Sources

- Site-specific cultural resource inventories. The Forest conducted cultural resource field surveys for this undertaking throughout 2008 and 2009. The primary objective of these surveys was to identify historic properties in the APE that may be affected by the undertaking and collect information on their current condition. The Motorized Recreation PA includes an identification strategy outlining cultural resource inventory requirements for most routes and areas considered for addition to the NFTS; however, inventory may be deferred for routes with light use. The former are considered "priority" surveys and the latter "deferred." Reports documenting the results of the surveys are on file at the KNF Supervisor's Office.
- Existing information was utilized from cultural resource records, oral interviews?, previous survey data, historic archives, maps and GIS spatial layers on file at the KNF Supervisor's Office.

3.12.5 Indicators

- Degree to which the integrity of historic property values are diminished.
- Number of historic properties within unauthorized routes at risk from ongoing use.
- Average number of historic properties per acre at risk if new routes or areas are created.

3.12.6 Methodology by Action

1. Direct/indirect effects of the prohibition of cross-country motorized vehicle travel.

Short-term timeframe: 1 year

Long-term timeframe: 20 years.

Spatial boundary: Forest scale where motor vehicle use is not already prohibited by law

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/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 to the NFTS

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 archaeological inventories of unauthorized routes, to identify cultural resources in the APE that may have direct, indirect, or cumulative effects.

Rationale: Motorized Recreation PA

3. Direct and Indirect Effects of Changes to the existing NFTS

None of these actions are considered an undertaking subject to NHPA Section 106 compliance (USDA Forest Service Policy for Section 106 of the NHPA Compliance in Travel Management: Designated Routes for Motor Vehicle Use (2005)). Motorized vehicles can already use NFTS roads. Allowing or prohibiting non-highway vehicle use will have no direct, indirect, or cumulative effect on cultural resources.

4. 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: Forest administrative boundary.

Indicator(s): Degree to which the integrity of historic property values are diminished, related to: location, design, setting, materials, workmanship, feeling, or association.

Methodology: Due to the relatively static boundaries of cultural resources sites, effects are limited to either direct/indirect in all of the action alternatives. Both types of effects have been identified during the analytical phase and mitigation measures have been prescribed to eliminate any potential for an adverse effect to NRHP values. These mitigation measures include continued monitoring, signage, installation of physical barriers, and removing routes from alternatives where site damage cannot be avoided. Extensive monitoring is prescribed in the Motorized Recreation PA following the designation of the NFTS. If potential threats are identified during the post-decision monitoring phase mitigation measures identified in the Motorized Recreation PA will be applied as necessary to eliminate any newly identified risks to NRHP values. Consequently, cumulative effects are not anticipated under any action alternative because cross-country travel is prohibited and mitigation measures have been prescribed to eliminate any potential for an adverse effect to NRHP values. Cumulative effects would be possible under the no-action alternative because cross-country travel would not be prohibited.

Rationale: Motorized Recreation PA.

3.12.7 Affected Environment

Cultural resources are the material manifestations of past human behavior and activities. The objective of this section is to review the most current information available regarding the scale, nature, and condition of cultural resources identified within the project area. These data provide a baseline for the comparison of effects reported in the subsequent Environmental Consequences section.

Section 106 of the National Historic Preservation Act requires federal land-managing agencies to take into account the effects of their undertakings on historic properties. The regulation defines a historic property as:

> any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register Criteria. (36 CFR §800.16(1)(1))

For this analysis, all cultural resource sites within the area of potential effect (APE) are considered historic properties, regardless of whether or not they have been formally evaluated using NRHP criteria (36 CFR §60.4).

In order for the Forest to determine the potential effects of the proposed action on historic properties, it is first necessary to identify the area of potential effect (APE). The 36 CFR§800 regulations define an APE as:

> the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR§800.16(d))

The APE for the cultural resources component of the Travel Management project is specifically defined in the Motorized Recreation PA as:

a. APEs include vehicular use areas, use as roads, trails, routes, corridors, stopping points, specifically defined open areas, trailheads, etc.). Roads and trails used to access favorite hunting areas, for example, would be considered part of APEs; hunting camps within 30 meter buffer zones of routes would be part of APEs, but hunting grounds that are closed to cross-country vehicular travel would not be considered part of APEs.

b. Inventory of associated areas included in APEs such as stopping points, trailheads, or vista points, should include the immediate surrounds that can generally be limited to a radius of 30 meters centered on point-specific locations (e.g., stopping points, vista points), or 30-meter wide buffer areas surrounding larger areas (e.g., trailheads). (USDA Forest Service 2006b:8).

Overview of Cultural Resources on the Klamath National Forest

The Klamath National Forest, east side, contains numerous prehistoric and historic archaeological sites, buildings, features and objects. Human presence on the lands managed by the Klamath National Forest begins with sporadic use by 11,000 years before present (BP) (Goebel 1996), with more distinct patterns of use appearing by 8000 to 6000 BP (Fentress 2002). The Shasta Valley, Klamath River and Butte Valley areas were all occupied by 7000 BP (Mack 1979, 1989, 1991; Sampson 1985; Jensen and Farber 1982), with Proto-Shastan and Modoc populations present by 5000 to 4000 BP (Cressman 1942).

Ethnographically, the Goosenest area was occupied by Shasta, Klamath and Modoc, all of whom retain a presence in the area (Ray 1963; Silver 1978; Stern 1998). The Shasta were concentrated along the Klamath, Salmon and Scott Rivers, and their tributaries, where riverine resources were the focus of settlement and subsistence. The Klamath and, to a lesser degree the Modoc focused settlement and subsistence on the lacustrine resources of the Klamath Basin marshes (the Modoc focused more on terrestrial resources). These groups were traditionally “hunters and gatherers” relying on local plant and animal resources for subsistence as they became available. Consequently, these groups practiced a highly mobile “seasonal round” type of settlement pattern moving frequently across the landscape. Many trails

established by these ethnographic groups for travel and trade became major travel routes in across the forest during the historic era.

The west side of the Klamath is also represented by a long history of cultural interactions with tribal groups along the Klamath River. This can be depicted as the area west of Interstate 5, following the Klamath River to Orleans. Ethnographic documentation for the west side is reflected in research presented by William Bright (1978) in his discussions of the Karuk; Kathryn and Robert Winthrop's research of the Konomihu (1991); and Shirley Silver's (1978) research of the Shasta. In essence, riverine resources played a major role in settlement and subsistence patterns, as well as the spiritual connectivity to the land through scheduled ceremonies (Palmer 1980). Travel routes accessed groups for trade, acquisition of resources such as acorns, basketry materials, wildlife, and ceremonial activities.

Euro-American explorers of the 1820s-40s found the Hupa, Karuk, and Shasta people living along portions of the lower/middle Klamath River drainage. Ancestors of the Shasta and Karuk people, speaking Hokan-family languages are believed to have been long-time residences of the region, and the apparently inhabited/used much of the west-side TMP/DCS project area, to the near exclusion of non-Hokan-speaking neighboring groups (such as the Hupa, the Takelma, the Klamath/Modoc, and the Wintu, respectively).

During the late 1820s through the 1840s, trappers and explorers began venturing into California. With the discovery of gold in Yreka in 1851 came a massive emigration of gold seekers and settlers into the area now encompassed by the Klamath National Forest. Numerous trails and routes crossing the Forest were the result, including: the Yreka Trail, a branch of the California National Historic Trail; the Tickner Road; the Lockhart Wagon Road, the Kelsey Trail, and the Deacon Lee Trail. These early roads were established to link settlements, transport supplies and access different mining communities.

In the 1870s, large-scale hydraulic mining of the area's low-elevation placer deposits began. These were generally well-capitalized operations that hired crews of wage laborers (many of them Chinese). From the 1870s into the early twentieth century, systems of high ditches, headboxes, iron-pipe penstocks, "giant" nozzles, huge sluice systems, and the other accoutrements of "hydraulicking" transformed some low-elevation areas into extremely modified landscapes of vast, linear 'washing pits' (the mined-out ancient alluvium) located within, adjacent, and parallel to the stream courses. Huge piles of alluvial cobbles and boulders accumulated within and near the washing pits as tailings – which today form an extensive tree-shaded/moss-covered habitat for small mammals, birds, and reptiles. Along the banks of the Klamath River, the size and depth of the river permitted large-scale hydraulic mining with wings dams exposing the river bed and "China pumps" removing the water seepage (this activity was then followed by early-twentieth century gold dredging in the creeks and rivers and along their banks).

With the end of the early years' labor-intensive placer operations, the area's mining population declined dramatically. In the nearby valleys, ranching took hold, with cattle and other livestock being driven up to the summer ranges in the mountains' high-elevation meadows. Lode (or "hard-rock) mining

for gold in the bedrock slopes of the project vicinity began as small operations during the late nineteenth century. Soon after 1900, a number of better-capitalized, longer-term underground-mining operations took place.

Logging occurred throughout the Forest to supply lumber and various wood products to support other industries. On the Goosenest District, with its open Eastside Pine habitat and terrain, logging was and continues to be the primary industry. In 1904 the Weed Lumber Company began extending its railroad based logging from Weed, California, reaching Klamath Falls, Oregon in 1909. In the process of this and later expansion, a substantial railroad grade system was established to facilitate logging operations. These railroad grades provide the footprint for the majority of roads on the Goosenest.

During the same period, the U.S. Forest Service began managing the new established Klamath National Forest, building trails into the high country. Small-scale placer and lode mining attracted a number of individuals hard-pressed by the Great Depression; large-scale dredge-mining operations also occurred during this time along a number of stretches of the Klamath and Scott Rivers.

Livestock grazing has occurred on Forest lands since the 1850s when cattle, pigs, and sheep were raised to feed local miners. Seasonal patterns of stock movement between valleys and higher elevations developed with grazing on the Goosenest concentrated on the crest of the Cascades and in Butte Valley. However, after a series of large land exchanges in the 1930s and 1940s, grazing was substantially expanded on the Goosenest. Similarly, stock movement on the west side of the forest utilized high elevation areas such as the Siskiyou Crest to lower elevations such as Scott Valley. Stock trails from grazing activities are evident across all districts and many of these trails are still used today to move cattle to and from grazing allotments.

The Klamath National Forest has a history of recreational use, and opportunities for recreation exist at both developed as well as dispersed sites throughout the Forest. Recreational activities tend to concentrate at lake or creek-side settings (fishing, camping), high elevation snowparks (snowmobiling, cross-country skiing), the OHV “play” area along Co. Highway A12, the Humbug OHV use area, and at dispersed campsites (hunting).

Existing Conditions

Cultural resource specialists conducted field surveys over several hundred acres in search of historic properties in the APE that may be affected by the undertaking. The Motorized Recreation PA includes an identification strategy outlining cultural resource inventory requirements for most routes and areas considered for addition to the NFTS; however, inventory may be deferred for routes with light use. The former are considered “priority” surveys and the latter “deferred.” The distinction is related primarily to vehicle use rates and, by extension, increased risk for potential adverse effects. These terms are used in all subsequent analyses. Inventory of all priority routes is complete. Deferred survey will be completed in accordance with the stipulations in the Motorized Recreation PA.

The existing condition of cultural resources identified in the APE provides baseline information with which to assess potential effects of adding routes to the NFTS. The first order indicator of existing conditions is the number of historic properties located within the project APE. To date, there are an estimated 43 properties that are considered "unevaluated" for eligibility to the National Register of Historic Places; nevertheless, all are treated as eligible properties for purposes of this undertaking (Motorized Recreation PA).

A second, more important indicator of existing conditions is the number of at risk historic properties currently identified within the project APE. This group is a subset of the 45 total properties citied in the last paragraph. An "at-risk historic property" is defined in the Motorized Recreation PA as:

> A property that the Forest Heritage Resource Manager (HRM) identifies as susceptible to being adversely affected as a result of designating a motor vehicle OHV [sic] route or specifically defined area, or using or maintaining the designated motorized recreation OHV system{sic}. An at risk historic property is identified based on property characteristics and proximity to designated OHV routes or specifically defined areas (e.g. trail corridor, trail head, vista point). (USDA Foerst Service 2006b:1.J).

The number of historic properties determined to be "at risk" is therefore based on their condition and proximity to the APE. The "at risk" category used in subsequent analyses consists of cultural resource sites with identified or potential direct, indirect or cumulative effects. The nature of any identified or potential effects to "at risk" properties is analyzed in table 3.5.1. The nature of effects to date include river use, ground disturbance from vehicles or foot traffic, wind erosion, and human or livestock trails impacts. The nature of effects could also include down-cutting, rutting, displacement, disturbance, damage, vandalism, looting, removal and alteration of historic structures, visual/audible/atmospheric damage to historic setting or cultural landscape/Traditional Cultural Property. Many effects are still unknown and will remain so until further monitoring is conducted.

In addition to the guidance in the Motorized Recreation PA addressing potential effects, the integrity measures listed in the adverse effect criteria at 36 CFR §800.5(a) were used to characterize the severity of any identified effects:

> Criteria of adverse effect: An adverse effect is found when an undertaking may alter, directly or indirectly , any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's' location, design, setting, materials, workmanship, feeling, or association. (emphasis added) consideration shall be given to all qualifying characteristics of a historic property including those that may have been identified subsequent to the evaluation of the property's eligibility for the

> National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. (36 CFR §800.5 (a)(1))

Different disturbance agents can combine in a variety of ways to create a potential threat to historic properties. This analysis documents both direct and indirect effects. Common direct effects include a route bisecting the primary locus of a cultural resource site. Routes may also cross or disturb features associated with a site. Indirect effects could include:

- Driving off established routes onto cultural sites.
- Ground disturbing activities associated with motorized vehicle camping on cultural sites or features.
- Motorized vehicle camping on a sites where users dismantle features for other purposes, such as shelter or fuel.
- Vandalism or looting of sites accessed by motorized vehicles.

All 43 sites in the APE have been identified as "at risk". Effects to the integrity of 10 of the 43 existing cultural resource sites identified in the APE were assessed. Insufficient information regarding the remaining 33 sites was available to determine the present condition or potential risk. While all 43 sites have been listed at risk, effects to the remaining 33 sites will be assessed before the completion of the final EIS. Ongoing survey and site assessment will address the nature of potential effect and severity of effect. Mitigation measures (if necessary), will be prescribed on a site by site basis. As previously mentioned, mitigation measures may include continued monitoring, signage, installation of physical barriers, or removing the route from an alternative.

Available data were reviewed for each cultural resource site in order to determine whether the addition of any route to the NFTS would diminish the integrity of the property's NRHP values, i.e., location, design, setting, materials, workmanship, feeling, or association. Table 67 summarizes the quantity and risk assessment for all cultural resources identified within the APE.

Table 67. Quantity and assessment of historic properties identified within the APE (as of April 2009)

Total "Not at Risk" Properties Identified within APE	0
Total "At-Risk" Properties Identified within the APE	10
Total Properties Identified within the APE where Condition is Unknown	33
Total Properties identified within the APE	43

A simple calculation of the number of at-risk historic properties provides only general information about potential effects. It does not sufficiently disclose the scale and severity of potential effects on any given property, nor does it address the type of mitigation measures that may be necessary to eliminate or

lessen all direct and indirect effects. The magnitude of effects to historic properties integrity determines the severity of any direct, indirect or cumulative effects (Table 68).

Table 68. Severity of effects on cultural resources and requirements for mitigation

Severity of Effects	Definition	Explanatory Notes
Negligible	Route bisects some portion of the cultural resource site, but the effect on NRHP values is insignificant	If the effect on integrity measures is determined to be negligible, there is essentially no measurable effect on the cultural resources: therefore no mitigation measures are prescribed.
Minor	Effects on cultural resources are minor, but not insignificant. Integrity of the NRHP values may diminish if measures are not taken to alleviate the potential effect.	If the severity of effect is considered "minor", some type of mitigation measure may be required. In some cases, monitoring is prescribed to ensure that the minor degree of disturbance does not increase over time. Phased mitigation in combination with monitoring may also be necessary.
Moderate	Effects on cultural resources 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 or improved if the detrimental activity is curtailed	A moderate determination requires mitigation. An adaptive management strategy will be employed where progressively more complex and potentially costly protective measure will be employed to eliminate a sustained potential for adverse effects.
Major	Effects on cultural resources are severe. If that particular 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 direct effects to the resource. In most cases, the only viable option may be re-routing the road/trail around the resource. Other mitigation measures may necessitate scientific data recovery which can be expensive and requires additional consultation under 36 CFR§800.

A summary of the 43 cultural resource sites whose integrity would be affected based on this analysis is provided in Table 69.

Table 69. Cultural resource effect severity (as of April 2009)

Negligible	Minor	Moderate	Major	Total
33	10	0	0	43

The mitigation measures prescribed in the Motorized Recreation PA are the minimal actions necessary to alleviate potential adverse effects. The PA specifies that all "at-risk" properties within the APE be monitored over a two-year period after designation. If monitoring demonstrates the mitigation measures initially prescribed prove ineffective, it will be necessary to proceed through stages that include progressively more complex protective measures in a sequential process that could culminate in route closure if other measures prove unsuccessful.

3.12.8 Environmental Consequences

The Affected Environment outlined in the previous section reflects the status of cultural resources under the no action alternative (alternative 1) in the short term. The calculations presented in that section provide baseline data used to form the scientific and analytic basis for the comparisons of the alternatives outlined in this current section. In this section, the data are broken down and evaluated in more precise detail to determine the effects that each of the five action alternatives (alternatives 2-6) will have on cultural resources. The disclosure of specific data related to the location or character of a historic property is regulated pursuant to stipulations in 36 CFR§800.11 and section 304 of the NHPA when disclosure may cause a significant risk. The LRMP also specifies that the location of cultural resource sites is confidential information.

Direct and Indirect Effects of the Alternatives on Cultural Resources

Three discrete management actions are common to each action alternative (with the exception of alternative 1 and alternative 3): (1) The prohibition of cross-country motorized vehicle travel, (2) changes to the existing NFTS, (3) the addition of facilities (unauthorized roads, trails, and/or areas) to the NFTS.

Effects of the Prohibition on Cross-country Travel and Changes to the Existing NFTS

For all action alternatives, the prohibition of motor vehicles on the 508,000 acres currently open and available to use would have a beneficial effect on cultural resources throughout the Forest in the short and long terms. It would curtail on-going potential for adverse effects and reduce the threat to cultural and historic properties that would occur if use were to continue on all unauthorized roads and trails. It would also help to eliminate potential effects resulting from the creation of any new routes and trails if cross-country motorized vehicle use was not prohibited. Under this prohibition, all future motorized vehicle trail off NFTS roads will be subject to NHPA section 106 compliance and potential effects to cultural and historic properties can be identified at the time.

Proposed changes to the existing NFTS are minimal. The most common modification proposed to existing NFTS routes is a change in permitted vehicle class. For purposes of this cultural resource assessment, it is assumed that there is no measurable difference in the magnitude of effects to cultural resources between full-size four-wheel drive vehicles, passenger vehicles, specialized off-highway vehicles, and single track motorcycle trails. Similarly, converting existing NFTS roads to administrative use would have no effect because use by administrative vehicles would result in the same or less effect than current use patterns.

Effects of adding Facilities to the NFTS

In each of the action alternatives described below, the assumptions stated in the last two paragraphs apply and no further analysis of those actions is attempted. All subsequent analyses focus on effects associated with each alternative. The Effects Analysis methodology section below provides a summary of how the

analyses were conducted. The data reported below differentiate between direct and indirect effects. The definitions for each are provided in NEPA implementing regulations. Effects on cultural resources and take the form of:

a. Direct effects, which are caused by the action and occur at the same time and place

b. Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR§1508.7)

Cumulative effects are also addressed: "Cumulative impact" is the impact on the environment [historic properties in this case] which result 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 other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR §1500 regulations are synonymous (40 CFR§1508.8).

Effects of Mitigation Measures on Cultural Resources

As described previously, mitigation measures may be proposed to eliminate or lessen effects to cultural resources. Mitigations may include monitoring, realignments of existing routes, seasonal closures, installation of single-post signs needed to help alleviate resource damage, and installation of non-intrusive barriers to control traffic flow.

Alternative 1 – No Action

Direct and Indirect Effects

Effects of the no action alternative on cultural resources are described in the Affected Environment section above. Consequently, the discussion here is limited to distinguishing between direct and indirect effects. Ten of the 43 cultural resource sites identified within the APE will be directly or indirectly affected or at risk if no action is taken to manage vehicle use. All of the remaining 33 cultural resource sites are listed as "at risk", but the effects have yet to be determined.

Table 70. Alternative 1 at-risk sites within the APE tabulated according to indirect/direct effects

Direct	Indirect	Direct and Indirect	Unknown	Total
1	1	8	33	43

Cumulative Effects

Ongoing and foreseeable road actions include the addition of 8 miles of ML 1 roads and 11 miles of ML 2 roads to the NFTS, and decommissioning of 16 miles of road. These road actions have or will have cultural resource reviews that will ensure they meet the requirements of the Regional Programmatic

Agreement through application of project design standards or mitigation measures. Effects on cultural resources from these projects are expected to be minimal.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Under alternative 2, 41 sites are considered "at risk". An indirect effect of erosion and potential use may compromise 05-05-51-212 in the future. One cultural resource site is classified as a direct effect on account of human and wildlife effects. One site is considered to have an indirect effect while 8 have both direct and indirect effects. All of the remaining 31 cultural resource sites are listed as "at risk", but the effects have yet to be determined (Table 71).

Table 71. Alternative 2 at-risk sites within the APE tabulated according to indirect/direct effects

Direct	Indirect	Direct & Indirect	Unknown	Total
1	1	8	31	41

Cumulative Effects

Cumulative effects are not anticipated because the NFTS would be well defined and all identified and potential effects of this project and any ongoing/foreseeable road-related activities will be mitigated.

Alternative 3 – Cross-Country Travel Prohibition Only – No Changes to the Current NFTS

Direct, Indirect and Cumulative Effects

Alternative 3 adds no new NFTS facilities, prohibits cross-country motorized travel, and amends the Forest plan with the prohibition. This alternative would have a beneficial effect on cultural resources throughout the Forest in the short and long terms. It would curtail on-going potential for adverse effects and reduce the threat to cultural and historic properties that would occur if use were to continue on all unauthorized roads and trails. It would also help to eliminate potential effects resulting from the creation of any new routes and trails if cross-country motorized vehicle use was not prohibited. Under this prohibition, all future motorized vehicle trail off designated NFTS roads will be subject to NHPA section 106 compliance and potential effects to cultural and historic properties can be identified at the time.

Alternative 4 – Maximize Quiet Recreation Opportunities

Direct, Indirect and Cumulative Effects

There are two cultural resource sites located in this alternative. Both sites are considered at risk and the effects have yet to be determined. An effects analysis will be completed before the final EIS is released.

Alternative 5 – Maximize Motorized Recreation Opportunities

Direct and Indirect Effects

A total of 33 cultural resource sites are considered at risk and may be affected under this alternative.

One site in alternative 5 is considered "at risk" due to indirect effects of erosion and potential use from recreationists accessing the site via the river. The severity of effect on this site has been minor; it will be signed and monitored under the requirements of the PA. Eight sites are sustaining both negligible direct and indirect effects and will receive signage and monitoring as mitigation measures. The remaining 24 sites are considered "at-risk" and will be assessed for effects.

Table 72. Alternative 5 at-risk sites within the APE tabulated according to indirect/direct effects

Direct	Indirect	Direct & Indirect	Unknown	Total
0	1	8	24	33

Cumulative Effects

Cumulative effects are not anticipated under alternative 5 because the NFTS would be well defined and all identified and potential effects (both direct and indirect) of this and ongoing and foreseeable road actions will be mitigated through application of project design standards or mitigation measures.

Alternative 6 – Refined proposed action

Direct and Indirect Effects

A total of 30 sites are considered "at-risk" for this alternative. One site will be indirectly affected. The severity of effect on this site has been minor; it will be considered for monitoring under the requirements of the PA. Eight sites are both direct and indirectly affected, and 21 sites remain unknown. A combination of signage and monitoring has been proposed as mitigation measures for these sites.

Table 73. Alternative 6 at-risk sites within the APE tabulated according to indirect/direct effects

Direct	Indirect	Direct & Indirect	Unknown	Total
0	1	8	21	30

Cumulative Effects

Cumulative effects are not anticipated under alternative 6 because the NFTS would be well defined and all identified and potential effects (both direct and indirect) of this and ongoing and foreseeable road actions will be mitigated through application of project design standards or mitigation measures.

Summary of Effects Analysis across All Alternatives

The quantity of cultural resource sites within the APE and the effects on those resources vary slightly among the six alternatives. Table3.5.1 summarizes the identified or predicted effects of all the alternatives at a forestwide scale. The number of cultural resource sites for which data are currently being analyzed are also quantified and disclosed.

Information regarding specific sites to be monitored is located in the project files at the KNF Supervisors Office.

Table 74. Cultural resource sites, effects, and alternative summary

Resource ID	At Risk?	Eligible for National Register	Nature of Effect	Severity of Effect	Effect Type*	Standard Protection Measure /Mitigation	Alt. #
West Side							
05-05-51-189	Yes	Unevaluated	Wildlife and human	Minor	Direct	Signage/ Monitor	2
05-05-51-214	Yes	Unevaluated		Negligible		Monitor	2
05-05-51-212	Yes	Unevaluated	Potential River Use	Minor	Indirect	Signage/ Monitor	2,5,6
05-05-55-287	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-54-106	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-54-107	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-54-113	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-55-162	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-55-279	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-51-10	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5
05-05-55-278	Yes	Unevaluated	Not Known	Negligible		Monitor	5,6
05-05-55-277	Yes	Unevaluated	Not Known	Negligible		Monitor	5
05-05-55-271	Yes	Unevaluated	Not Known	Negligible		Monitor Feature 2	2
05-05-55-270	Yes	Unevaluated	Not Known	Negligible		Monitor	2
05-05-55-276	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
East Side							
05-05-57-42	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-334	Yes	Unevaluated	Not Known	Negligible		Monitor	2,4,5,6
05-05-57-190	Yes	Unevaluated	Not Known	Negligible		Monitor	2
05-05-57-200	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-717	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-718	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-663	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-1549	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6

Resource ID	At Risk?	Eligible for National Register	Nature of Effect	Severity of Effect	Effect Type*	Standard Protection Measure /Mitigation	Alt. #
05-05-57-1548	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-56	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-1309	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-254	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-816	Yes	Unevaluated	Not Known	Negligible		Monitor	2
05-05-57-585	Yes	Unevaluated	Not Known	Negligible		Monitor	2
05-05-57-1292	Yes	Unevaluated	Not Known	Negligible		Monitor	2
05-05-57-200	Yes	Unevaluated	Not Known	Negligible		Monitor	2
05-05-57-640	Yes	Unevaluated	Not Known	Negligible		Monitor	2
05-05-57-1284	Yes	Unevaluated	Not Known	Negligible		Monitor	2
05-05-57-105	Yes	Unevaluated	Not Known	Negligible		Monitor	2,4,5,6
05-05-57-348	Yes	Unevaluated	Not Known	Negligible		Monitor	2,5,6
05-05-57-675	Yes	Unevaluated	Multiple sources of disturbance	Minor	Direct/ Indirect	Signage/ Monitor	2,5,6
05-05-57-676	Yes	Unevaluated	Multiple sources of disturbance	Minor	Direct/ Indirect	Signage/ Monitor	2,5,6
05-05-57-1049	Yes	Unevaluated	Multiple sources of disturbance	Minor	Direct/ Indirect	Signage/ Monitor	2,5,6,
05-05-57-1208	Yes	Unevaluated	Multiple sources of disturbance	Minor	Direct/ Indirect	Signage/ Monitor	2,5,6
05-05-57-1209	Yes	Unevaluated	Multiple sources of disturbance	Minor	Direct/ Indirect	Signage/ Monitor	2,5,6
05-05-57-1210	Yes	Unevaluated	Multiple sources of disturbance	Minor	Direct/ Indirect	Signage/ Monitor	2,5,6
05-05-57-1280	Yes	Unevaluated	Multiple sources of disturbance	Minor	Direct/ Indirect	Signage/ Monitor	2,5,6
05-05-57-1283	Yes	Unevaluated	Multiple sources of disturbance	Minor	Direct/ Indirect	Signage/ Monitor	2,5,6

(Note: * denotes sites where continued monitoring is necessary to determine nature and effect. Mitigation may include monitoring, signage, flag and avoid, etc.).

Compliance with the Forest Plan and Other Direction

The Klamath National Forest Land and Resource Management Plan (USDA Forest Service 1995) outlines the minimum conditions to be retained throughout the Forest in order to ensure resource protection end enhancement.

Alternative 3 would comply with all LRMP standards and guidelines. Given the current data available, the selection of alternatives 2, 4, 5 or 6, without mitigations, could possibly compromise the LRMP cultural resources standards and guidelines. However, given the small site density and ease of monitoring all mitigation measures could be very easily met. Alternative 1 would not comply with LRMP standards and guidelines.

3.13 Botanical Resources

3.13.1 Introduction

The Pacific Southwest Region contains the largest assemblage of sensitive plant species in comparison to its land base. Well over half of the more than 8,000 vascular plant species occurring in California, 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 (Tibor 2001). Over 100 plant species are found only on NFS lands and no where else in the world.

Management of plant and fungi species and 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). The LRMP (1995) states:

> 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 Forest land and resource management plan.

Key parts include: developing and implementing management practices to ensure that species do not become threatened or endangered because of Forest Service 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 to manage.

Management decisions related to motor vehicle travel can affect plant and fungi species, their habitats, and natural communities. Effects include, but are not limited to: death or injury to plants and habitat modification, habitat fragmentation, decrease in habitat quality, including increased risk of weed introduction and spread, change in hydrology, increased erosion, compaction, and sediment, risk to pollinators, loss of vegetation, overcollection, or other factors reducing or eliminating plant growth and reproduction (Trombulek 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 public motor vehicle use on NFS lands (USDA Forest Service 1997 [FSM 2353.03(2)]). Therefore, management decisions related to motor vehicle travel on NFS lands must consider effects to plant species, fungi species, and their habitats.

3.13.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action 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 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.

Presidential Executive Order 13112, Invasive Species, 64 FR 6183 (February 8, 1999). This order addresses prevention and control of the introduction and spread of invasive species.

Forest Service Manual and Handbooks (USDA Forest Service 1997 [FSM/H 2670]). Forest Service sensitive 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.

Conservation Assessment for *Cypripedium fasciculatum* and *Cypripedium montanum* (USDA Forest Service 2005). Addresses the biology, management, and conservation of these species within California.

Conservation agreement for *Horkelia hendersonii*, and *Lupinus lepidus* var. *ashlandensis* (USDI USFWS 2002).

Klamath National Forest Land and Resource Management Plan. The Klamath National Forest (KNF or Forest) LRMP (USDA Forest Service 1995) contains the following management direction applicable to motorized travel management and botanical resources.

Table 75. KNF LRMP goals, standards and guidelines for biological diversity and sensitive plants

Standard and Guideline	Biological Diversity
6-7	Manage for a distribution and abundance of plant and animal populations that contribute to healthy, viable populations of all existing native and desirable non-native species. Maintain populations throughout their historic range. Develop strategies to determine the response of sensitive species proposed for endangered or threatened listing by the USFWS or by the National Marine Fisheries Service as well as indicator species to management activities.
6-8, 7-1–4	Sensitive species - survey project areas or assess presence of habitat
6-11	Use native plant species when seeding, planting, or re-vegetating areas disturbed during project implementation. When native species are not available, or where non-native plant species will better meet the management goals, non-native plant species may be used. When selecting non-native species for use, avoid the introduction of species that are allelopathic, highly invasive or likely to out-compete natives for space, water and nutrients.
6-13	Management activities should be designed to maintain or increase population levels of desirable native plant species that currently have low population levels, of desirable plant species with limited habitat distribution and of desirable plant species that have problems with disease. Examples include Port-Orford-cedar, sugar pine, Pacific yew, Brewer spruce, etc.
Sensitive Plants	
7-1	Enhance sensitive plant species populations and habitat to maintain reproducing, self-sustaining populations. Conduct an assessment to determine which sensitive species are at a higher risk. Develop management strategies for higher risk sensitive plant species first, with the intent of preventing the need for the species to become listed as T&E species.
7-2	Coordinate species maintenance and enhancement goals with other management activities on the site.
7-3	Management activities should imitate the natural ecological processes that created the sensitive species habitat. Fire, timber management, grazing, or other activities may be used as tools for soil disturbance and removal of competing vegetation in managing the habitat.
7-4	Disturbances to plant populations and occupied habitat should be avoided during critical periods of plant growth. Individual projects shall develop project-level mitigations measures to avoid adverse impacts to sensitive species.
Wildlife	
8-42	Maintain or enhance meadows where appropriate.

The LRMP also contains land allocations with specific guidance relating to protection and management of botanical resources.

Management Area 1 – Research Natural Areas

MA1-8—Prohibit recreational use that threatens or interferes with the objectives or purposes for which the RNA was proposed or established (FSM 4063.3). Within the management area itself, manage to generally achieve primitive recreation opportunity spectrum (ROS) conditions. Management areas next to the RNA shall not be influenced by the primitive ROS designation.

MA1-9—Close these areas to OHV use.

Management Area 5 – Special Habitat

This management designation includes three types of special habitat (Table 76):

1) Late-successional reserves (LSRs) are designed to provide for the viability needs of all late-successional species in an ecosystem approach

14) Areas of habitat needed to support the recovery of federally listed threatened and endangered (TE) wildlife populations

15) Habitat for the sensitive plant, *Calochortus persistens* (Siskiyou mariposa lily)

Table 76. Acres allocated to special habitat

Name	Acres
Late Successional Reserves	396,600
Bald eagle	7,800
Peregrine falcon	6,300
Calochortus persistens	1,000
Total Acres	**411,700**

The 1,000-acre area designated for *Calochortus persistens* consists of dry rocky outcroppings within mixed conifer forest. The habitat for this species has been managed since 1982 under guidelines developed by the Forest in a species management guide. This species is listed by the State as rare, and has been a candidate for Federal listing as endangered since 2002.

Management direction prohibits any ground disturbance that would adversely affect the known habitat or physically disturb existing plants. Cross-country travel in this Special Interest Area (SIA) is currently prohibited under a Forest Order.

MA5-77—Prohibit any ground disturbance that would adversely affect the known habitat (by introducing weedy species) or physically disturbing existing plants. Disturbed areas near this habitat should be managed to exclude nonnative invasive plant species.

MA5-78—Conduct programmed or permitted activities within the management area so as not to adversely affect the habitat values for the *Calochortus*.

MA5-81—Allow vehicular traffic on established roads. New road construction shall not be allowed in this management area. Off-highway traffic shall not be allowed.

Management Area 7 – Special Interest Areas

There are three types of SIAs on the KNF: botanical and geologic areas (6), botanical areas (18), and geologic areas (21). These areas support outstanding or especially interesting natural or cultural features. The goal is to interpret the surroundings for public enjoyment and increased understanding of natural resources while maintaining the values for which the SIAs were established (KNF LRMP 1995). Motorized vehicle use within these SIAs is either excluded or discouraged. Table 77 summarizes information for botanical, and botanical and geologic SIAs.

Table 77. Acres allocated to special interest areas

Name	Total Acres	Feature/Significance
Botanical and Geologic Areas		
Black Lava Butte and Callahan Lava Flow	2,800	Basalt flow with lava tubes, spatter cones.
China Mountain	900	Hemlock, whitebark pine, foxtail pine community. High elevation. Ultramafic soils.
Cook and Green Pass	200	Diversity of crest zone plant species. Peridotite rock outcrops.
Cory Peak	400	Serpentine crest zone sensitive species. Rock glacier.
Kangaroo Lake	400	Sensitive plants and species diversity. Glacial features.
Preston Peak	3,800	Diversity of conifer species. Glacial features.
Botanical Areas		
Bear Peak	500	Conifer species found in granite glacial cirque.
Grey Pine	400	Northern-most location of this species.
Duck Lake	3,600	Diversity of conifers and endemic species.
Elk Hole	200	Southern-most population of Alaska yellow cedar.
Horse Creek	200	"Old growth" riparian vegetation.
Indian Creek Brewer Spruce	100	Vigorous stand of this endemic species.
Lake Mountain Foxtail Pine	100	Northern-most location of foxtail pine.
Little Shasta Meadow	700	Diverse wet meadow plant community.
Mount Ashland/Siskiyou Peak	800	Endemic plants crest zone community.
Observation Peak	500	Endemic plants crest zone community.
Poker Flat	100	Sensitive plants and species diversity.
Red Mountain	400	Serpentine endemic species.
Rhododendron Patch (Mill Creek)	100	Large inland patch of coastal Rhododendron.
Rock Fence Creek	100	Serpentine riparian plant community.
Scott Mountain	500	Serpentine crest zone endemic plant species.
Seiad Baker Cypress	1,000	Large stand of this rare conifer species.
Sutcliff Creek	100	Example of Port-Orford-cedar.
White Mountain	100	Only population of *Sausseria americana* in California.

MA7-7—Develop recreational use that is compatible with the goals and objectives of the SIA. Where there is established recreational use of an area, develop the SIA to accommodate that use.

MA7-8—Restrict OHV use.

MA7-9—Emphasize interpretive opportunities where appropriate.

MA7-10—Manage recreational settings to generally achieve semi-primitive or roaded natural ROS conditions.

The LRMP included standards and guidelines for management of survey and manage species – rare or uncommon species about which little was known. Through a series of lawsuits and agreements, the survey and manage species were given different status. The species that were designated USFS sensitive are addressed in the section on sensitive species. Species that were not designated sensitive are addressed as species of interest.

3.13.3 Effects Analysis Methodology

The analysis of effects on rare plant species was a three-step process:

Step 1 – map and record review

The first step consisted of a map and records review to identify all listed or proposed rare species that were known or were believed to have potential to occur in the analysis area. A 500-foot buffer was used to determine which species might potentially be affected by the project. This distance was also used to measure areas of sensitive plant sites in the vicinity of existing and proposed routes. Fourteen species were determined to occur or potentially occur on or near unauthorized routes. See the pre-field and preliminary botany screening documents located in the project record.

Step 2 – effects of unauthorized routes identified in the proposed action on TES species

In the second step, the identified unauthorized routes were considered for impacts to TES species:

- Assess routes within 500 feet of known populations of sensitive species that may be negatively affected by OHV use: *Tauschia howellii, Phacelia cookei, Ivesia pickeringii, Rorippa columbiae, Cypripedium fasciculatum* and *Cypripedium montanum*.
- Consider effects on sensitive bryophytes.
- Assess routes within meadows or grasslands.
- Assess roads within botanical special interest areas (SIAs).

Recommendations developed to help guide development of the action alternatives:

- Do not designate routes within 500 feet of known populations of TE plants or plants with conservation agreements: *Phlox hirsuta, Calochortus persistens, Lupinus lepidus var..ashlandensis, Horkelia hendersonii,* and *Calochortus greenei*. The 500 foot distance is recommended in the Programmatic Biological Assessment (BA) for Travel Management (October 2006, Version 1, USFWS 2007) as the distance needed to reduce external influences, minimize adverse effects to hydrologic processes, and to allow for population expansion.
- Do not designate routes that access meadows (or meadow/riparian combinations) for more than one mile.

- Do not designate routes less than 1.5 miles in length that access meadows; routes longer than 1.5 miles that access meadow/riparian areas for less than one mile were recommended for further review.
- Do not designate routes within botanical research natural areas (RNAs).

Conclusions of Step 2 review

- 96 routes (74 roads and 22 trails) were found to have potential impacts on TES plants, including five routes that have the potential to adversely impact *Calochortus persistens* habitat.
- 520 routes (444 roads and 76 trails) should receive further review due to routes intersecting habitats of concern. There is not enough information to determine if resource impacts are occurring. Further review may include map and photo analysis or field reviews to determine the potential for negative impacts.
- 559 routes (518 roads and 41 trails) were found to have no conflicts with TES or their habitats.

In Steps 1 and 2, 67 routes were identified as needing additional field surveys for sensitive species. Field surveys of those routes were conducted during the 2008 field season. See the pre-field botany screen spreadsheet located in the project record for a list of target species and routes surveyed.

Step 3 – effects of additional unauthorized routes identified in alternatives 3, 4, 5, and 6 on TES species

In Step 3, additional analysis was conducted on routes that were added to the inventory after public scoping to assess potential effects to TES species. Evaluations were based on prior field visits, GIS data, and additional field reviews as necessary. Data were imported into a Geographic Information System (GIS) and used to analyze potential habitat, identify proximity of known TES plant occurrences to routes, and analyze effects. All data are in the project record.

The following geographic areas were chosen to analyze the effects of the proposed routes on botanical resources:

- The no action alternative (alternative 1), which allows for cross-country travel, was assessed using all lands on the KNF with slopes of less than 35 percent that are within 100 and 500 feet of unauthorized routes.
- The entire KNF was used to analyze cumulative effects to rare species for all alternatives.
- Direct effects to rare plant species were assessed using the area within 30 feet of existing routes or those proposed for designation to the NFTS. Indirect effects were assessed on the area within 100 feet of unauthorized routes.

Assumptions Specific to Botanical Resources Analysis

This analysis is based on several assumptions to help analyze direct, indirect, and cumulative effects. These assumptions are listed below:

1) Vehicle use on and off established routes has affected or has the potential to affect rare plant populations, either directly by damage or death to individual plants from motor vehicles (stem breaking, crushing, etc.), or indirectly by altering the habitat through soil disturbance, changes in hydrologic functioning, or by the introduction of nonnative, invasive plant species that can out-compete sensitive species for water, sunlight, and nutrients.
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 lava caps, 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 nonnative plants (weeds) will continue to spread along and within surfaced and unsurfaced motor vehicle roads/trails/areas.
4) Impacts to rare plant species are assumed to be limited to within 500 feet of the motorized routes, with most direct effects occurring within 30 feet and most indirect effects occurring within 100 feet, except in areas where cross-country travel is allowed.
5) All areas have not been surveyed, so unknown occurrences of sensitive species may be present.
6) NFTS and proposed additions to the NFTS could have increased use which may increase impacts to sensitive species through production of dust, etc. The analysis assumes that vehicles will remain on authorized routes once they are designated.
7) All vehicles are assumed “equal”. Hence the impacts to sensitive species from a motorcycle are assumed equal to those impacts from a four-wheeled vehicle.
8) No new roads will be constructed. All routes included in the action alternatives currently exist and are being used by motor vehicles.
9) Seasonal closures of NFTS roads have no impact to rare plants or their associated habitats.

3.13.4 Data Sources

1) Route-specific botanical data (e.g., threatened, endangered, and sensitive (TES) species and habitats) including results of route-specific surveys of rare species. Surveys were conducted
2) Route inventories collected in step 1 of travel management and associated tabular data sets.
3) GIS layers of the following data: routes, rare plant and survey and manage species, and the Forest GIS vegetation coverage. Data used for this analysis comes from the KNF database, which is a spatial database compiled from data collected through the 2008 field season.
4) Conversations with Marla Knight, Botanist Klamath National Forest, December 2008-May 2009.

3.13.5 Botanical Resource Indicators

The following general indicator measures were used to compare alternatives. These indicator measures were selected based on literature review of possible impacts to sensitive plants/fungi and plant communities; native plant connectivity; and professional judgment. See note on "proposed" routes in following section on methodology.

- Acres available for cross-country travel.
- Miles of roads and motorized trails proposed for addition to the NFTS within 100 feet of rare plant sites.
- Acres of rare plant sites within 100 feet of roads and trails proposed for addition to the NFTS.
- Miles of roads and trails proposed for addition to the NFTS in special management areas with sensitive plant species.
- Miles/acres of noxious weeds within 100 feet of roads and trails proposed for addition to the NFTS.

3.13.6 Botanical Resource Methodology by Action

Direct, indirect and cumulative effects on botanical resources are analyzed for all project actions described below. Impacts are analyzed for three types of actions:

1. Direct and Indirect Effects of the Prohibition on Cross-country 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. Wildfire, unforeseeable future projects, demographic changes, etc., make assumptions beyond this timeframe speculative. These timeframes will apply for each action proposed in all alternatives.

Spatial boundary: KNF lands within 500 feet of unauthorized or proposed routes in addition to the entire area of cross-country travel.

Indicator(s): Listed under each alternative.

Methodology: GIS analysis of routes and TES plant sites.

2. Direct and Indirect Effects of Adding Facilities to the NFTS

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: KNF lands within 500 feet of unauthorized or proposed routes.

Indicator(s): Listed under each alternative.

Methodology: GIS analysis of routes and TES plant sites.

3. Direct and Indirect Effects of Changes in the Existing Season and Class of Use

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: KNF lands within 500 feet of unauthorized or proposed routes.

Indicator(s): Listed under each alternative.

Methodology: GIS analysis of routes and TES plant sites.

4. 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: KNF.

Indicator(s): Listed under each alternative.

Methodology: GIS analysis of routes and TES plant sites.

3.13.7 Affected Environment

Background and Scope

Cross-country travel is currently allowed on approximately 1.2 million of the 1.68 million total acres on the Forest. Many of these acres cannot be accessed by motorized vehicles due to terrain and vegetation density. Due to steep terrain (> 35 percent slope) in many areas, there are only about 508,000 acres where cross-country travel by motor vehicles is practicable.

The KNF, located mostly in Siskiyou County, northern California with a small portion in Jackson County, southern Oregon, contains a wide diversity of plant species (approximately 2,000 species) and communities due to varying elevation and precipitation zones that occur within the area. Plant communities include a variety of vegetation types arranged in dynamic patterns influenced by geology, climate, and past and recent disturbances. Plant communities continually change in response to natural

and human created disturbances such as wildfires, ecological succession, climate change, wind, drought, insects, and management activities.

The geologic history of the area, including floods, volcanic eruptions, landslides and erosion, has shaped the landscape of the Forest into a unique combination of landforms and vegetation patterns. This unique combination of geology and topography has produced a distinctive pattern of steep, heavily timbered slopes on the western portion of the Forest and gently rolling, open woodlands on the east. Ecological habitats ranging from low to high elevation include: juniper, sagebrush, grasslands, scrub oak, mixed chaparral, ponderosa pine, montane shrubland, bitterbrush, mixed conifer (east and west versions), Douglas-fir, lodgepole pine, true fir (east and west), montane meadows, and alpine grassland. Riparian areas and wetlands occur throughout. Given this combination of physiography and climate, habitats are highly variable and retain a legacy of botanical diversity. Structural elements such as size and density of vegetation vary greatly within a type depending on the frequency and intensity of fires and other disturbances or past management.

Many acres of Klamath National Forest NFS lands are considered fragmented with other ownership embedded within and adjacent to the Forest. These inholdings are managed by other Federal agencies (such as BLM), private individuals and corporations, the states of California and Oregon, and local municipalities and agencies of municipalities. The presence of these inholdings affects the current condition and future outlook of Klamath National Forest NFS lands. Connectivity is desired for many species of plant (and animals). Connectivity is often described in terms of large geographic areas of particular vegetation types (such as mixed conifer) that are not fragmented by roads, development or other disturbances. Wilderness, inventoried roadless areas, special interest areas (SIAs), and research natural areas (RNAs) also provide some native plant connectivity. Wilderness, inventoried roadless areas and RNAs would not be affected by this project. Effects to botanical SIAs and special habitat areas (referred to collectively as special management areas) are considered in the analysis.

Botanical Resources

The KNF provides habitat for approximately 2,000 vascular plant taxa, which represents approximately 25 percent of the California flora (Hickman 1993). Rare plant species, as referred to in this analysis, include federally listed and candidate, as well as sensitive species and species of interest. Rare plants require special management attention to ensure their continued viability, and they have been included on the KNF sensitive plant list or they are managed as survey and manage species, or both. The KNF threatened, endangered, and sensitive plant list includes one candidate, and four federally listed vascular plants (Table 78). There are 37 regionally sensitive vascular plants (including the one candidate species), seven rare mosses, six rare fungi, and one lichen (Table 79).

Federally Listed Species

There are currently four federally listed plant species considered in analyses on the KNF: *Arabis macdonaldiana, Astragalus applegatei, Fritillaria gentneri,* and *Phlox hirsuta*. *Arabis macdonaldiana* occurs in the outer North Coastal Ranges where no routes are proposed by this project. *Astragalus applegatei* and *Fritillaria gentneri* have not been found on the KNF. *Phlox hirsuta* is covered by the route designation design criteria letter of concurrence from the USFWS (2007). By following the recommended design criteria, route designation will meet the "No Effect" or "Not likely to adversely affect" determinations. Forests may tier to this consultation with no further consultation.

There are no proposed routes within 500 feet of occupied habitat of these four species in any of the alternatives. Federally listed species and habitat are described in Table 78 and will not be considered further in this analysis.

Federal Candidate Species

There is currently one candidate for Federal listing considered in the analysis on the KNF: *Calochortus persistens. Calochortus persistens* is not covered by the route designation design criteria letter of concurrence from the USFWS (2007). Informal consultation was conducted by telephone and email with the USFWS on April 10, 2009 and April 16, 2009. Since the one route of concern for potential impacts to the project was removed from all alternatives, the USFWS did not have concerns about the project. See emails in the project file.

Table 78. Species federally listed as endangered (E), threatened (T), proposed (P), or candidate (C)

	Species	Habitat	Number of Populations on KNF[a]	Status / Trend
*	*Arabis macdonaldiana Eastw.* (E)	Ultramafic soils, 3,900-7,200 ft. and granite soils in Jeffrey pine. Western Klamath Ranges and outer North Coast Ranges.	2	Generally in areas with little resource or land use conflicts. Due to rarity, all populations need protection.
*** +	*Astragalus applegatei Peck* (E)	Alkaline floodplains, around 4,100 ft.	None known	Due to rarity all populations need protection (FWS recovery plan)
*** +	*Fritillaria gentneri Gilkey* (E)	Grassland and chaparral habitats, within or at edges of dry, open woodlands, < 4,450 ft.	None known	Due to rarity all populations need protection (FWS draft recovery plan)
*	*Phlox hirsuta E.Nelson* (E)	Open, rocky serpentine ridges and slopes, 2,400-4,400 ft. Extreme eastern Klamath Range.	2	Due to rarity all populations need protection (FWS recovery plan 2006)
	Calochortus persistens Ownbey (C)	Open, rocky ridge tops at 6,000 ft. Eastern Klamath Range	12	All populations need protection. (FWS draft Conservation Agreement)

Key:
* = Officially listed as endangered by the State of California.
** = Officially listed as rare by the State of California.
*** = Officially listed as endangered by the State of Oregon
C = Federally listed candidate species
+ = Suspected to occur, but not currently documented.
H = Historic occurrence, not currently documented

a - As used here, several populations may make up an occurrence.

Sensitive Plant Species

Sensitive plant species are those species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution, or such low numbers or limited distribution that special management consideration is required to maintain their presence and viability, regardless of current trend (USDA Forest Service 1997 [FSM 2670.5]; USDA Forest Service 1997 [FSH 2609.25, 1.31]). A viable population is defined as one that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within the planning area (USDA Forest Service 1997 [FSM 2670.5]). Sensitive species that are on or may be on the KNF are listed in Table 79.

Table 79. Region 5 plants listed as sensitive that may occur on the Klamath National Forest

	Species	Habitat	Number of known populations[a]
	Vascular Plants		
+	*Botrychium crenulatum W. H. Wagner*	Moist habitats including meadows, seeps, springs, riparian areas. Often on edge of creek banks in conifer forests.	None
+	*Botrychium lunaria (L.) Sw.*	Moist habitats, meadows, streamsides, seeps, springs.	None
+	*Botrychium minganense Victorin*	Conifer and hardwood forests, riparian areas, meadows, shrublands >4,500 ft.	None
+	*Botrychium montanum W. H. Wagner*	Late successional/old growth conifer forests in wet shady areas with saturated soils. >4,500 ft.	None
H	*Botrychium pinnatum St. John*	Along shaded and open streams and meadows in conifer forests, moderate to high elevations.	One historic, near KNF
+	*Botrychium virginianum (L.) Swartz*	Riparian areas heavily shaded by conifer or conifer/hardwood overstory.	One, on private within KNF
	Calochortus greenei Wats.	Dry open areas in woodlands and forest and stand edges, 2,400-6,500 ft.	2
C**	*Calochortus persistens Ownbey*	Dry, rocky, exposed ridge tops, around 6,000 ft.	12
	Campanula wilkinsiana Greene	Riparian, rocky, open streamsides in conifer forest to above timberline, 5,700-8,600 ft.	2
	Chaenactis suffrutescens A. Gray	Rocky open slopes and cobbly river terraces on ultramafic soil, 2,600-6,900 ft.	2
+	*Collomia larsenii (Gray) Payson*	Volcanic peaks and cinder cones, >7,000 ft.	0
	Cypripedium fasciculatum Wats.	Variable, conifer and hardwood forest, 1650-5600 ft.	106
	Cypripedium montanum Lindl.	Moist areas, dry slopes, mixed evergreen and coniferous forests, 1,600-5,900 ft.	92
	Draba carnosula O. E. Schulz	Rocky ultramafic or granodiorite slopes and cliffs, >6,000 ft.	3
	Epilobium oreganum Greene	Wet meadows, bogs, streamsides, usually on ultramafic soils, 1,500-7,400 ft.	3
*	*Eriogonum alpinum Engelm.*	Loose ultramafic gravel, open subalpine forest, 6,700-9,000 ft.	2
	Eriogonum hirtellum J.T. Howell and Bacig.	Bald serpentine outcrops or gravelly slopes and ridges, 200-5,500 ft.	42
	Eriogonum ursinum S. Watson var. erubescens Reveal & J. D. Knorr	North facing rocky ridge tops, openings in montane shrublands, 5,300-6,200 ft.	6
+	*Erythronium citrinum Wats. Var. roderickii Shevock & Allen*	Granitic or weathered ultramafic soils in mid-montane mixed conifer forests with somewhat open canopy	None
+	*Eucephalis vialis Bradshaw*	Conifer forests, dry upland sites, in canopy gaps and forest edges	None
+	*Frasera umpquaensis M.E. Peck & Applegate*	Mtn meadows, moist openings in red fir forests, 550-6,500 ft.	None

	Species	Habitat	Number of known populations[a]
	Horkelia hendersonii J. Howell	Dry, open, gravelly slopes and ridges, openings in red fir forest, 6700-7500 ft.	7
	Ivesia pickeringii Torr. Ex Gray	Conifer forest, seasonally wet spots or dry edges of wet meadows, ultramafic or gabbro soils, 2,700-4,900 ft.	8
	Lupinus lepidus Dougl. Ex Lindl. Var. ashlandensis (B.J.Cox) Isley	Open, rocky ridge tops on Sandy soils, > 6,000ft.	1
H	*Mimulus evanescens Meinke*	Seasonal wetlands, 400-5,500 ft.	One historic
+	*Minuartia stolonifera Nelson & Nelson*	Rocky slopes on ultramafic soils, mixed conifer forests, 4,100-5,300 ft.	5
	Parnassia cirrata Piper var. intermedia (Rydb.) P.K. Holmgren & N.H. Holmgren	Hillside seeps and fens in montane mixed conifer forest.	None
	Pedicularis howellii Gray	Edges of openings, shad in conifer forest.4,000-6,500 ft.	28
	Phacelia cookei Const. & Heckard	Loose sandy-ash soils on old mud flow, disturbed or open sites with sparse vegetation.	1
	Phacelia greenei J. Howell	Bare ultramafic ridges and openings in Jeffrey pine and red fir, 5000-7000 ft.	16
	Phacelia inundata J. Howell	Alkaline flats, dry lake margins, 500-6,600 ft.	1
+	*Polemonium chartaceum H. Mason*	Serpentinite, granitic, and volcanic substrates, rock and talus, 5900-13,000 ft.	None
	Raillardella pringlei Greene	Perennial springs, seeps, fens, or streams on ultramafic soils, 400-7500 ft.	5
	Rorippa columbiae (Robinson) Howell	Seasonally inundated areas along rivers, playas, snowmelt streams, lakes, wet meadows, and drying lakebed, 4,200-5,600 ft.	2
	Smilax jamesii G. Wallace	Riparian areas and draw, usually in mixed conifer or red fir forest or montane chaparral, 1900-6000 ft.	17
	Tauschia howellii (Coult. & Rose) Macbr.	Openings in subalpine and upper montane conifer forest, on decomposing granitic soils on ridge tops and upper slopes, 5,500-8,300 ft.	9
	Thermopsis robusta J. Howell	Openings, along ridge lines, lower montane forest, roadsides, openings in Douglas-fir and mixed evergreen forest, < 4,500 ft.	13
	Fungi Species		
	Boletus pulcherrimus Thiers & Halling	Coastally influenced forest, Douglas-fir with hardwoods, moist sites.	1
	Cudonia monticola Mains	Mature, moist conifer forest	2
	Dendrocollybia racemosa (pers.: Fr.) Peterson & Redhead	Mixed forest with coast live oak, tanoak and Douglas-fir, along streams	2
	Phaeocollybia olivacea A.H.Smith	Conifer and hardwood forest where it can grow in the humus layer, mid-seral forest, incl. partial cut units.	5
	Sowerbyella rhenana (Fuckel) J.Moravec	Mature conifer forest.	5

	Species	Habitat	Number of known populations[a]
	Tricholomopsis fulvescens A.H.Smith	Old growth conifer forest, >3,300 ft.	2
	Bryophyte Species		
+	*Buxbaumia viridis (DC.) Moug. & Nestl.*	Logs or stumps in late stages of decay, on humus or mineral soil, cool moist spots at mid elevations	None
	Fissidens aphelotaxifolius Pursell	Wet soil, humus, rock along narrow streams and near small waterfalls, in damp or wet crevices of cliffs, <6,300 ft.	1
	Helodium blandowii (Web. & Mohr) Warnst.	Wet meadows and seeps in subalpine conifer forest and alpine lakes.	3
	Meesia triquetra Ångstr.	Montane fens, 4,300-9,700 ft.	3
	Meesia uliginosa Hedw	Montane fens, 5,900-9,200 ft.	5
	Mielichhoferia elongata (Hoppe &Hornsch. Ex Hook) Nees & Hornsch. In Nees et. Al	Metamorphic, sedimentary, limestone, granite and serpentine rock outcrops, seasonally moist to moist soils, < 3,550 ft.	1
	Ptilidium californicum (Aust.) Underw.	Epiphytic on tree trunks, logs and stumps, mid-elevation Douglas-fir and true fir forest on moist north-facing slpes or near riparian areas.	101
	Lichen species		
+	*Hydrothyria venosa*	In shallow streams fed bycold water streams	1 on private w/l KNF boundary

Key:
* = Officially listed as Endangered by the State of California.
** = Officially listed as Rare by the State of California.
*** = Officially listed as Endangered by the State of Oregon
C = Federally listed Candidate species
+ = Suspected to occur, but not currently documented.
H = Historic occurrence, not currently documented
a - As used here, several populations may make up an occurrence.

Species of Interest

Twenty-one species of interest (formerly survey and manage) occur on the KNF. The KNF is not within the range of 13 species, has no habitat for one species, and four other species have never been found on the Forest. Three species, *Tetraphis geniculata*, *Schistostegia pennata*, and *Leptogium cyanescens,* do not occur within 500 feet of mapped unauthorized routes. These species are not considered further in this analysis. Additional information regarding these species is contained in the project files.

Noxious Weeds Infestations

Regional biodiversity is at increased risk due to alterations in human uses, fire regimes, climatic change, and changes brought about by weed invasion (D'Antonio et al. 2004). Climate changes may result in massive geographical shifts in locations of sites that provide environments for native plants and opportunities for replacement of native species with weeds will be enhanced. On the KNF, most weed occurrences are located along roads or in highly disturbed areas.

Weeds, especially when abundant, directly compete with native plants and can cause displacement of natives on a local scale. In addition, weeds can have a number of indirect effects including changes to aesthetic values, biological diversity, and ecosystem functions (D'Antonio et al. 2004). Potential impacts include: alteration of disturbance regimes (including wildfire), changes in the food base for wildlife species, soil erosion and loss of soil carbon storage, decreases in range or forest productivity and altered hydrology.

3.13.8 Environmental Consequences

All federally listed and Region 5 sensitive species were considered in step 1 of this analysis. Species carried forward in the analysis include sensitive species within 500 feet of unauthorized routes (alternative 1) or routes proposed for designation (alternatives 2, 5, and 6) and one candidate for listing: *Calochortus persistens* (also a Region 5 sensitive species). Although the KNF botanist has determined that this species is not currently affected by motorized use, it is carried forward in the analysis. Informal consultation with the USFWS was conducted by telephone and email on April 10, 2009 and April 16, 2009. The route that was of concern as possibly impacting the candidate species *Calochortus persistens* was removed from all alternatives except alternative 1.

The no action alternative (alternative 1) also considers all sensitive species found in accessible areas (less than 35 percent slope). It is important to note that the analysis below represents what is currently known about motorized vehicle impacts along existing unauthorized routes. No new road or trail construction is proposed under any of the alternatives. Routes described as "proposed" in the following discussion already exist on the ground and are proposed for inclusion in the KNF travel management system. Sensitive species that may be affected by this project are listed in Table 80.

Table 80. Sensitive species known to occur within 500 feet of unauthorized or proposed routes

Species	Habitat	Alternatives
Calochortus greenei	Dry open areas in woodlands and forest and stand edges, 2,400-6,500 ft.	1, 2, 5, 6
Cypripedium fasciculatum	Variable, conifer and hardwood forest, 1,650-5,600 ft.	5
Cypripedium montanum	Moist areas, dry slopes, mixed evergreen and coniferous forests, 1,600-5,900 ft.	1
Eriogonum hirtellum	Bald serpentine outcrops or gravelly slopes and ridges, 200-5,500 ft.	1, 2, 5, 6
Helodium blandowii	Wet meadows and seeps in subalpine conifer forest and alpine lakes.	1, 2
Horkelia hendersonii	Dry, open, gravelly slopes and ridges, openings in red fir forest, 6,700-7,500 ft.	1
Meesia triquetra	Montane fens, 4,300-9,700 ft.	1, 2
Meesia uliginosa	Montane fens, 5,900-9,200 ft.	1, 2, 5, 6
Mimulus evanescens	Seasonal wetlands, 400-5,500 ft.	1, 2, 5, 6
Phacelia cookei	Loose sandy-ash soils on old mud flow, disturbed or open sites with sparse vegetation.	1
Ptilidium californicum	Epiphytic on tree trunks, logs and stumps, mid-elevation Douglas-fir and true fir forest on moist north-facing slopes or near riparian areas.	1, 2, 5, 6
Rorippa columbiae	Seasonally inundated areas along rivers, playas, snowmelt streams, lakes, wet meadows, and drying lakebeds, 4,200-5,600 ft.	1
Thermopsis robusta	Openings, along ridge lines, lower montane forest, roadsides, openings in Douglas-fir and mixed evergreen forest, < 4,500 ft.	1, 5, 6

Direct Effects

Direct effects occur when individual plants are broken, crushed, or crushed by vehicles traveling or parking off road surfaces, or their habitat is physically impacted by disturbance or compaction of the soil. Vehicles traveling on or parking off the route surface can alter growth, or reduce seed set through physically breaking, crushing, or uprooting plants resulting in death, (Wilshire et al. 1978; Cole and Bayfield 1993). Root exposure and/or direct root damage may occur due to vehicle passes over vegetation, particularly in loose soils, or in wet soils susceptible to rutting; these impacts can affect plant vigor and survival success.

Direct effects are dependent upon the intensity and timing of disturbance. Effects are also dependent upon the number of plants at a specific location and the proportion of the occurrence impacted. Repeated damage of this type weakens the compensatory capabilities of rare plants, which can lead to degradation of habitat and eventually to the replacement of native plants species with nonnative species more adapted to frequent disturbances, such as invasive weeds.

Indirect Effects

Indirect effects are caused by the action and occur later in time, or further removed in distance, but are still reasonably foreseeable. Indirect effects to rare plants can occur from soil erosion or compaction, dust, habitat fragmentation or from the potential displacement of rare and native species with nonnative or invasive species. Indirect impacts to soil from repeated off-road vehicle use can lead to the degradation of habitat for rare plants and other native plant communities. Soil compaction, erosion, and modification of soil properties can affect the distribution, abundance, growth rate, reproduction, and size of plants (Ouren et al. 2007). Wilshire and Nakata (1976) report that initial use by OHVs results in a loss of cohesion and lateral displacement of soils, while repeated use leads to compaction. The effects of soil erosion on plants can include undercutting of root systems as routes are enlarged by erosion, creation of new erosion channels in areas not used by vehicles, wind erosion of adjacent destabilized areas, burial of plants by debris eroded from areas of use, and reduction of the biological capability of the soil by physical modification and stripping of fertile layers (Wilshire et al. 1978).

Soil compaction and the subsequent decrease in infiltration and distribution of water through the soil profile can lead to decreased moisture available for plant growth. Compaction caused by repeated off-highway vehicle use, can result in reduced seed germination, seedling survival, soil water infiltration (Wilshire et al. 1978), and plant and root growth. In rare plant habitat, soils subjected to vehicular traffic that become compacted and eroded due to wheel ruts may become unsuitable for seedling development and the sustainability or expansion of that rare plant population could be affected. Compaction by vehicles also contributes to roadside invasions of exotic plant species by reducing native plant vigor and creating areas of competition-free space that are open to invasion (Ouren et al. 2007; Trombulak and Frissell 2000; Wilshire et al. 1978). Trombulak and Frissell (2000) report the spread of exotics by vehicles through habitat alteration, stress on native species, and creation or maintenance of movement corridors. Repeated damage to rare plant species can lead to the degradation of habitat and eventually to the replacement of native plant species, with species more adapted to frequent disturbance, such as invasive weeds. Off-highway vehicles have been shown to accelerate weed invasions (Von der Lippe and Kowarik 2007) by reducing native plant vigor and cover, creating a competition-free habitat open to invasion, and acting as a vector for seed dispersal.

Dust from motor vehicle use has also been shown to decrease native plant cover and vigor by reducing rates of photosynthesis, respiration, transpiration (Spellerberg and Morrison 1998, *in* Ouren et al. 2007), and water-use efficiency. Dust can block photosynthesis, respiration, and transpiration, and may even be sufficient in some cases to alter community structure (Trombulak and Frissell 2000).

Habitat fragmentation resulting from increased density of roads may create “islands” of otherwise suitable habitat that are too small to allow for maintenance of populations of certain plants. Fragmentation also results in a greater amount of edge area relative to the amount of interior habitat area. Newly created edges experience changes in microclimate conditions which may alter plant communities (Collinge 1996). Numerous studies have addressed the results of habitat fragmentation to plant populations and the

pollinators upon which they depend (Young et al. 1996; Jules 1998; Harrison and Bruna 1999). Research findings vary depending on the type of plants, pollinators, and location. Donaldson et al. (2002) found no variation in species diversity of pollinators in habitat fragments of different sizes, but found that fragment size and distance to large fragments had a significant effect on fruit and seed set for four of the seven perennial plant species studied. Jennersten (1988) found a lower diversity and abundance of both flowering plants and insect pollinators in fragmented habitats. In her studies, seed set was much lower in fragmented habitats. These studies are not conclusive, but suggest the possibility that habitat fragmentation by road creation and use, and associated activities may affect plant populations. No habitat fragmentation studies have been conducted for the sensitive plant species analyzed in this report; their responses to habitat fragmentation are not known.

Wetlands and associated plants may be indirectly affected by cross-country travel. Sediments and chemicals washing into wetlands from road or cross-country travel may compromise water quality. Vehicle travel in or adjacent to wetlands may create ruts that do not heal by themselves, and allow water to flow out of the wetland; over time the wetland may dry to the extent that it no longer supports wetland vegetation or provides wetland functions.

Cumulative Effects

Cumulative effects result from the incremental impact of an action when added to the effects of past, present, and reasonably foreseeable future actions. Past activities are considered part of the existing conditions and are discussed within the Affected Environment section above. This is because the 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. 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 to those effects.

The Forest boundary was chosen as the cumulative effects analysis area for all rare species within this analysis. Ongoing or future actions on private lands within the forest boundary may also have cumulative impacts on these species, but since survey requirements and mitigations for rare plant species are not known, the type and extent of the potential impacts to rare plant species on private lands cannot be quantified.

The existing condition of rare plants on the KNF is the result of multiple past disturbances on multiple scales across the landscape, including volcanic activity, erosion, and fire, as well as human-caused disturbances, which have created a diversity of plant habitats on both spatial and temporal scales. Knowledge of rare plants, their locations on the Forest, and their habitat needs have increased over the years, but remains incomplete. Botanical surveys for KNF projects are conducted with a primary focus on known potential habitat for TES plant species. They do not cover entire project areas due to lack of available staff for intensive surveying at ideal times for each species. Also, many species of concern are very small in stature and are easily overlooked during surveys. Therefore, it is possible that isolated

populations have been overlooked during surveys. It is probable that documented occurrences of TES plant species are an incomplete representation of occurrences actually present on the Forest. Scientific understanding of rare plant ecological needs has increased with time, but for most rare plant species little is known about specific ecological requirements and responses to different types of disturbances. Overall, there is no way to determine what impact past activities have or have not had on each species and their potential habitat, due to a lack of historic knowledge and detailed habitat requirements for these species.

Present and future activities that are associated with the proposed route system could impact rare species growing along or in the vicinity of designated routes. These activities may include routine maintenance, such as clearing brush, posting signs, cleaning, or clearing of debris, or increased levels of dispersed recreation along and near routes. Most of these activities would be located within the 100-foot buffers along proposed routes that are analyzed in this document. Ongoing and foreseeable road-related activities may also contribute to impacts to rare plant species. A complete list of current and known future projects is included in appendix B.

Monitoring of road and trail conditions (chapter 2) will detect if resource damage is occurring to sensitive species, and will result in the development of species-specific mitigations or route closure.

Alternative 1 – No Action

Indicators

- Acres available for cross-country travel: 508,000
- Miles of unauthorized routes within 100 feet of rare plant sites: 5.22
- Acres of rare plant sites within 100 feet of unauthorized or proposed routes: 50.55
- Miles of unauthorized or proposed routes in special management areas with sensitive plant species: 0.16
- Miles/acres of noxious weeds within 100 feet of unauthorized or proposed routes: 3.21/ 54.50

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Alternative 1 does not propose the addition of any motorized trails to the NFTS and does not prohibit cross-country travel on the Forest. Under this alternative, it is impossible to quantify when and where rare plant species and habitats would be impacted by motor vehicles; therefore this analysis uses the unauthorized routes currently in use as a representation of current motor vehicle use on the Forest. In addition, the analysis addresses species that may occur on the approximately 508,000 acres of land on the Forest with slopes less than 35 percent as this is the area accessible to motorized vehicles (Table 81).

In the short term, effects in terms of the number of occurrences and acres of habitat affected would be the same as the current situation or would increase as use of existing unauthorized routes would continue

and new routes could be created. Over the long term, establishment of new routes could impact an undetermined additional number of plant occurrences, and cause more pervasive and severe impacts to potential habitat.

Table 81 Sensitive species in areas accessible to motorized use alternative 1 (< 35% slope)

Species	Within 30 feet	Within 100 feet	Acres within 500 ft of unauthorized routes
Calochortus greenei	X	X	7.94 (0.41)
Calochortus persistens	X	X	60.67 (3.42)
Chaenactis suffretescens			
Cypripedium fasciculatum			
Cypripedium montanum			0.07
Draba carnosula			
Eriogonum alpinum			
Eriogonum hirtellum			(0.28)
Helodium blandowii			3.97
Horkelia hendersonii	X	X	2.24
Ivesia pickeringii			
Lupinus lepidus var. ashlandensis			
Meesia triquetra		X	7.66
Meesia uliginosa			3.97 (12.62)
Mimulus evanescens			1.49
Minuartia stolonifera			
Pedicularis howellii			
Phacelia cookei	X	X	118.13
Phacelia greenei			
Phaeocollybia olivacea			
Ptilidium californicum			0.27 (0.55)
Raillardella pringlei			
Rorippa columbiae	X	X	47.90
Smilax jamesii			
Tauschia howelii			
Thermopsis robusta			(7.38)
Total acres			**254.31 (24.66)**
Grand Total			**278.97**

Within accessible areas there are occurrences of 26 sensitive species; there could also be occurrences as yet undiscovered. It is expected that cross-country use would damage at least some sensitive species occurrences, and it is reasonable to expect that some occurrences would be lost. Within 100 feet of unauthorized routes currently in use by motorized vehicles, there are occurrences of six sensitive species. Direct and indirect effects to these six species are considered low; but all species, except the most inaccessible, would be subject to direct, indirect, and cumulative effects with continued cross-country use.

Cross-country travel by merely one vehicle has the potential to crush rare plants. Kellomaki and Saastmoinen (1975, *in* Yorks et al. 1997) noted that the initial use of a trail creates the greatest deterioration; even as few as 1 to 20 passes have been shown to reduce plant cover by stunting plants (Adams et al. 1982, *in* Ouren et al. 2007). Vehicles traveling through mud easily alter surface hydrology, potentially blocking water from sensitive plant habitat, or conversely, potentially flooding it. Vehicles travelling cross-country may destroy the biological soil crust that holds the soil surface in place. Over the long-term, cross-country motorized vehicle use could destroy significant numbers of sensitive plants and occurrences could be lost. In addition, introduction of weeds could eventually eliminate the occurrences.

Noxious weeds are known to affect rare plants and their habitats. A full discussion of the effects of this project on the introduction and spread of noxious weeds is presented in the Non-native Invasive Species section.

Direct Effects: Direct impacts include killing and/or injuring sensitive species. Cross-country use would also damage other native vegetation and plant communities, increasing the risk of erosion and changing habitat conditions. The significance of direct impacts depends on timing, frequency and extent of disturbances.

Of particular concern are five species that are extremely rare: *Calochortus persistens*, *Calochortus greenei*, *Horkelia hendersonii*, *Lupinus lepidus*, and *Rorippa columbiae*. All of these species have been found to occur within 30 feet of unauthorized routes.

The KNF botany program recommends that all occurrences of the first four species be protected (KNF 2006). Unauthorized routes could directly impact *Calochortus persistens*, a species that is ranked as globally critically imperiled and imperiled in California (NatureServe 2008). These routes occur in a management area designated as special habitat. LRMP direction allows motorized use on existing roads (LRMP 1995), but in step 1 of this process, KNF botanists recommended that routes be closed to OHV use to avoid resource conflicts with *Calochortus persistens*.

Calochortus persistens is found in a special habitat area that is currently closed to cross-country travel under a Forest Order. Several unauthorized routes occur within the area and three would be of concern if the area were open to cross-country travel.

The other four species are at high risk of impact due to their proximity to established unauthorized routes, which will continue to be available for use under this alternative. As routes proliferate, all these species may be directly affected by crushing, root damage, or dust effects.

Horkelia hendersonii is ranked by NatureServe as critically imperiled on a global scale and in California. *Lupinus lepidus* is common globally but this variety (*ashlandensis*) is critically imperiled globally and in Oregon. There are few occurrences of each on the Forest. Both occur in dry, open areas with sparse vegetation. In a Conservation Agreement with the USFWS, the Forest Service agreed to

manage these two species to avoid detrimental impacts. Measures to be taken include discouraging off road vehicle travel where needed (USFWS 2002).

Calochortus greenei and *Rorippa columbiae* are also uncommon on the Forest, but are more common in other areas and are ranked as globally vulnerable. *Rorippa columbiae* occurs in a variety of seasonally inundated areas. Species adapted to perennially or seasonally wet areas are dependent on the regularity of hydrologic conditions. Conditions may be altered by short and long-term OHV use, directly or indirectly, by de-watering, rutting, changing the drainage patterns to these systems or by moving sediments into these areas.

Special Management Areas: Two unauthorized routes enter two SIAs with sensitive plants. KNF botanists determined that use of these two routes are not adversely impacting the sensitive plants and would not be expected to in the future if current levels of use continue (Table 83). Three unauthorized routes that occur in the special habitat area designated for *Calochortus persistens* habitat threaten the plant and its habitat.

Indirect Effects: One fen species, *Meesia triquetra*, occurs within 100 feet of unauthorized routes and may be affected indirectly by motorized use. Indirect effects to fens are generally less damaging than direct effects. Routes that pass through fens or along edges of fens and wet meadows cause long-term adverse impacts to rare plant habitat and individuals, which can include impacts such as a loss of vegetation, changes in hydrology, accelerated erosion, and soil compaction. Indirectly, soil compaction can influence drainage patterns as well as cause ruts in these well-defined soils. In either case, water infiltration into fens and wet meadow soils is slowed or drainage patterns altered. These effects can permanently convert rare fen and wet meadow habitats into dry meadows. In addition, these habitats can be highly susceptible to invasion from noxious weed species that thrive in wet conditions such as Canada thistle (*Cirsium arvense*).

Passive recovery of established unauthorized routes will continue in the *Calochortus persistens* Special Interest Area. Under this alternative, the Forest Order closing the area to cross-country travel will continue. No indirect impacts from this alternative are expected to occur to this species as long as cross-country travel is prohibited.

Implementation of alternative 1 would indirectly impact sensitive species in the short- and long-term by increasing the risk of weed introduction and spread on KNF system lands. Implementation of alternative 1 carries the highest risk of introduction and spread of aggressive, nonnative plants (weeds) since it does not prohibit cross-country travel on most of the Forest (except closed areas such as areas wilderness and RNAs). Motorized vehicles could access more National Forest System (NFS) lands and potentially spread weeds to accessible sensitive plant occurrences. Under implementation of alternative 1, the number of unauthorized motorized routes would likely increase through cross-country use. Unauthorized routes that are known to have weed infestations have a high risk of increasing weed spread.

Surveys to date have identified 21 species occupying approximately 3,059 acres in the area accessible to motorized vehicles.

Direct and Indirect Effects of Adding Facilities to the NFTS

Alternative 1 does not add motorized trails to the NFTS. There would be no effects.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Alternative 1 does not propose changes in use. There would be no effects.

Cumulative Effects

Under alternative 1, cross-country vehicle travel would continue, and unauthorized routes would continue to proliferate within the project area. Unmanaged motor vehicle use on the KNF has the potential for negative direct and indirect effects to all of the rare species known to occur within all areas accessible to motorized vehicles.

Under this alternative, motor vehicles traveling on and off unauthorized routes could crush, kill, and uproot rare species. Indirect effects to rare species and their associated habitats described in the general effects section could apply to all occurrences and species found within the project analysis area. However, the potential impacts would most likely occur to those species within 100 feet of existing unauthorized routes. Habitats which are open and accessible are most susceptible.

One of the largest potential impacts from cross-country motorized use is the increased risk of noxious weed introduction and spread. Noxious weeds reduce the quality of native (including rare plant) habitat by displacing native species, altering nutrient and fire cycles, degrading soil structure, and decreasing the quality and availability of forage for wildlife. Under this alternative, all but the most inaccessible habitats are at risk of noxious weed invasion and spread from cross-country motor vehicle travel, due to the potential for all roads within the project area to spread weeds. See the non-native invasive species section for more information on effects on noxious weed introduction and spread.

Ongoing and foreseeable road-related activities would add eight miles of ML 1 road and eleven miles of ML 2 road to the NFTS, and remove 16 miles of road from the NFTS. The cumulative effect of these activities is a reduction in the mileage of open roads by five miles. Negative direct and indirect impacts to rare plants and their habitats from Forest management activities are minimized by conducting botany surveys prior to project implementation, with flagging and avoiding all rare plant occurrences. Compliance with the Klamath National Forest weed management strategies (USDA Forest Service 2001) during all management activities minimizes the risk for introduction and spread of noxious weeds.

Determinations of Effects of Alternative 1 for Species Considered

May affect individuals, but not likely to result in a trend toward Federal listing or a loss of viability: *Calochortus greenei, Calochortus persistens, Chaenactis suffrutescens, Cypripedium fasciculatum, Cypripedium montanum, Draba carnosula, Eriogonum alpinum, Eriogonum hirtellum, Helodium blandowii, Horkelia hendersonii, Ivesia pickeringii, Lupinus lepidus var. ashlandensis, Meesia triquetra, Meesia uliginosa, Minuartia stolonifera, Pedicularis howellii, Phacelia cookei, Phacelia greenei, Phaeocollybia olivacea, Ptilidium californicum, Raillardella pringlei, Rorippa columbiae, Smilax jamesii, Tauschia howellii,* and *Thermopsis robusta.*

No impact*: Mimulus evanescens*

Calochortus persistens, *Horkelia hendersonii*, *Lupinus lepidus* var. *ashlandensis*, and *Phacelia cookie* are extremely rare and in some cases are in close proximity to existing unauthorized routes. (See rankings above under direct effects of Alternative 1 for descriptions of rarity). The remaining species are less rare, or though very rare (globally critically imperiled or imperiled), they do not occur near existing unauthorized routes. *Mimulus evanescens* is known only from one historic occurrence and is not expected to be impacted by the project. KNF botany staff search for the site annually, but have not found it for five to ten years.

Alternative 2 – Proposed Action

The proposed action was developed by an interdisciplinary team using input on public-identified inventoried unauthorized routes, ML 1 roads, and mixed use on ML 3 roads. It includes the prohibition of cross-country motorized travel, proposed changes to the existing NFTS, and the additions to the NFTS as described in the Notice of Intent (NOI) published October 7, 2008 (Volume 73, Number 195).

Indicators

- Acres available for cross-country travel: 65
- Miles of proposed roads/motorized trails within 100 feet of rare plant sites: 0.12
- Acres of rare plant sites within 500 feet of proposed roads/motorized trails: 0.74
- Miles of proposed roads/motorized trails in special management areas with sensitive plant species: 0
- Miles/acres weeds within 100 feet of proposed roads/motorized trails: 0.87/12.15

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Prohibiting cross-country travel would discontinue vehicle use over 508,000 acres of the Forest. The potential for disturbance to or loss of rare plants from motorized vehicles, as described in alternative 1, would be eliminated for these acres.

Over the long-term, through decompaction of substrate and the return of native vegetation, disturbed sites could regenerate sufficiently to support native plant communities.

Direct and Indirect Effects of Adding Facilities to the NFTS

Under alternative 2, seven proposed routes are within 500 feet of occurrences of seven sensitive plant species. All proposed routes were determined to have no adverse effect on sensitive species.

One access route for a dispersed recreation site is within 30 feet of a sensitive species site. The species, *Meesia uliginosa*, occurs in montane fens. Based on prior field visits, KNF botanists determined that the *Meesia uliginosa* site was not threatened by the proposed route. Yellow starthistle and other weeds also occur along proposed routes. These weed species do not ordinarily grow in areas as wet as *Meesia* habitat. They could, however, spread into surrounding upland areas.

Alternative 2 proposes two areas for OHV use off designated routes: Humbug and Juniper Flats. As there are no sensitive plants within 500 feet of either site, sensitive plants would not be affected by motorized use in these areas. Motorized use would, however, directly impact the plant communities in these two areas. Direct effects to plant communities may be expected to include damage to native plants, destruction of native plants, elimination of biotic soils and alterations in the composition, structure and function of plant communities. Indirect effects to plant communities may include increased erosion, reduced vegetation cover which could change microsite environmental conditions, increased dust and introduction of weeds to the areas. Given the level of disturbance in these areas, it is possible that weeds would not be able to establish and spread. No weeds are known to occur at Juniper Flats. Small patches of yellow starthistle occur at the Humbug site. This species has become so widespread on the KNF that the Forest has made the decision to treat it only in certain areas, such as entrances to wilderness. Any weeds that do establish in either area could be transported to other locations on the Forest.

Special Management Areas: There are no proposed routes in SIAs or special habitat areas for plants under this alternative.

Direct and Indirect Effects of Adding Facilities to the NFTS

Alternative 2 proposes changes to the NFTS. (1) Vehicle class on portions or all of 24 roads would be changed from highway-legal only, to both highway-legal and nonhighway-legal allowed (allow mixed use); (2) vehicle class on portions or all of 8 roads would be changed from both highway-legal and nonhighway-legal, to highway-legal only allowed (prohibit mixed use); (3) two maintenance level 1 roads would be opened: 40N51 and 41S10. Since development of this alternative, 40N51 has been determined to be open. Neither road is within 100 feet of sensitive plants or noxious weed sites. Changing the type of use will not affect botanical resources.

Table 82. Sensitive species within 500 feet of proposed routes under alternative 2

Route	Species	Miles	Within 30 feet	Within 100 feet	Acres within 100 feet
Proposed trails	None	0			
Proposed roads	None	0			
70E.1	*Helodium blandowii*	0.15			
	Meesia uliginosa	0.15			
	Meesia triquetra				
8Q01. 11 / 8Q01.3	*Mimulus evanescens*	0.16			
Total Miles		0.46			
Proposed dispersed recreation sites access					
52-13	*Eriogonum hirtellum*	0.04			
55-64	*Ptilidium californicum*	0.04			
57-13	*Meesia uliginosa*	0.12	X	X	0.74
57-21	*Calochortus greenei*	0.02			
Total Miles		0.22			
Grand Total		0.68			0.74

Table 83. Acres of known sensitive species sites within 500 feet of proposed routes

Species	Proposed Trails	Proposed Roads	Proposed Dispersed Recreation Site Access
Calochortus greenei			0.41
Eriogonum hirtellum			0.28
Helodium blandowii		0.33	
Meesia triquetra			
Meesia uliginosa		0.33	11.25
Mimulus evanescens		2.99	
Ptilidium californicum			0.55
Total		3.65	12.49
Grand Total			16.14

Cumulative Effects

This alternative added to the ongoing and foreseeable road-related activities would result in a prohibition of cross-country travel on 508,000 acres of available lands, the addition of eight miles of ML 1 roads and 103 miles of ML 2 roads and motorized trails to the NFTS, decommissioning of 16 miles of road, and designation of two areas where cross-country travel is allowed (65 acres). The routes and areas proposed for designation under this alternative already exist and are being used. There will be no change from the current situation regarding the potential for impacts to botanical resources on these routes. Negative impacts to rare plants and their habitats from other management activities are minimized by conducting

botany surveys prior to project implementation, and flagging and avoiding all rare plant occurrences. The risk of impacts to rare plants is reduced by eliminating motorized use from 508,000 acres and 345 miles of existing, unauthorized motorized routes. The cumulative effect of these activities should be beneficial.

Implementation of Alternative 2 would decrease cumulative effects to sensitive species relative to current conditions due to the prohibition of cross-country travel throughout most of the Forest. Motorized use of Humbug and Juniper Flats would contribute effects to native plant communities and soils and may increase the spread of weed species outside these areas.

Determinations of Effects of Alternative 2 for Species Considered

May affect individuals but not likely to result in a trend toward Federal listing or a loss of viability: *Meesia uliginosa.*

No impact*: Calochortus greenei, Eriogonum hirtellum, Helodium blandowii, Meesia triquetra, Mimulus evanescens, Ptilidium californicum.*

Beneficial: *Calochortus persistens, Chaenactis suffrutescens, Cypripedium fasciculatum, Cypripedium montanum, Draba carnosula*, *Eriogonum alpinum*, *Horkelia hendersonii*, *Ivesia pickeringii, Lupinus lepidatus* var. *ashlandensis, Minuartia stolonifera*, *Pedicularis howellii*, *Phacelia cookei, Phacelia greenei*, *Phaeocollybia olivacea*, *Raillardella pringlei*, *Rorippa columbiae*, *Smilax jamesii, Tauschia howellii*, and *Thermopsis robusta*.

Only one species, *Meesia uliginosa*, is within 100 feet of a proposed route. Although *Meesia uliginosa* is fairly common rangewide, it is considered imperiled in California where the proposed route occurs. The species occurs in fens and would not be impacted directly by vehicle use; but could experience indirect effects of use. The other species within 500 feet of proposed routes are either more common, or if imperiled or critically imperiled, they do not occur near routes. The *Mimulus evanescens* occurrence is historic. Forest botanists search for the site annually, but the species has not been found for five to ten years. For species occurring in areas away from proposed routes but within areas accessible to motorized use, this alternative would be beneficial due to the prohibition of cross-country travel.

Alternative 3 – Cross-country Travel Prohibition Only – No Changes to Current NFTS

Alternative 3 meets the objective prohibiting cross-country travel, but proposes no new additions to the NFTS. No unauthorized roads, trails, or areas would be added to the NFTS. Alternative 3 also responds to issues 2–4 (cost, maintenance, wilderness, quiet use, and natural resource impacts).

Indicators

- Acres available for cross-country travel: 0
- Miles of proposed roads/motorized trails within 100 feet of rare plant sites: 0

- Acres of rare plant sites within 500 feet of proposed roads/motorized trails: 0
- Miles of proposed roads/motorized trails in special management areas with sensitive plant species: 0
- Miles/acres weeds within 100 feet of proposed roads/motorized trails: 0

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Prohibiting cross-country travel would discontinue vehicle use over 508,000 acres of the Forest. The potential for disturbance to or loss of rare plants from motorized vehicles, as described in alternative 1, would be eliminated for these acres.

Over the long-term, through decompaction of substrate and the return of native vegetation, disturbed sites could regenerate sufficiently to support native plant communities.

Direct and Indirect Effects of Adding Facilities to the NFTS

No new facilities would be added under this alternative. There would be no direct or indirect effects.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

There would be no changes to the existing system and no direct or indirect effects.

Cumulative Effects

This alternative does not add mileage to the NFTS; therefore, cumulative effects of this project and ongoing and foreseeable road-related activities are the added effects of those road actions and the prohibition of cross-country travel. Ongoing and foreseeable road-related activities would add eight miles of ML 1 roads and eleven miles of ML 2 roads to the NFTS, and decommission 16 miles of road. Negative impacts to rare plants and their habitats from other management activities are minimized by conducting botany surveys prior to project implementation, and flagging and avoiding all rare plant occurrences. The risk of impacts to rare plants is reduced by eliminating motorized use from 508,000 acres and 437 miles of existing, unauthorized motorized routes. The cumulative effect of these activities should be beneficial.

Determinations of Effects of Alternative 3 for Species Considered

Beneficial: All species.

All species will be benefitted by the reduced amount of motorized use resulting from the prohibition of cross-country travel and the lack of designation of currently unauthorized routes under this alternative.

Alternative 4 – Maximize Quiet Recreation Opportunities

Alternative 4 responds to issues 2–4 (cost, maintenance, wilderness, quiet use, and natural resource impacts) by prohibiting cross-country travel and adding fewer routes to the NFTS in response to these concerns.

Indicators

- Acres available for cross-country travel: 0
- Miles of proposed roads/motorized trails within 100 feet of rare plant sites: 0
- Acres of rare plant sites within 500 feet of proposed roads/motorized trails: 0
- Miles of proposed roads/motorized trails in special management areas with sensitive plant species: 0
- Miles/acres weeds within 100 feet of proposed roads/motorized trails: 0.19/1.23

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Prohibiting cross-country travel would discontinue vehicle use over 508,000 acres of the Forest. The potential for disturbance to or loss of rare plants from motorized vehicles, as described in alternative 1, would be eliminated for these acres.

Over the long-term, through decompaction of substrate and the return of native vegetation, disturbed sites could regenerate sufficiently to support native plant communities.

Direct and Indirect Effects of Adding Facilities to the NFTS

Under this alternative, 1.71 miles of unauthorized routes would be added to the NFTS as roads to access dispersed recreation sites; 4.45 miles of unauthorized routes would be added to the NFTS as roads to provide a diversity of motorized recreation opportunities. 0.73 miles of unauthorized routes would be proposed as motorized trails. Five routes would allow motorized mixed use. No motorized areas would be added under this alternative.

The addition of 6.89 miles of unauthorized routes to the NFTS road system would allow continued motor vehicle traffic within 100 feet of one documented noxious weed occurrence, but not within 100 feet of any sensitive species. The presence of the noxious weed occurrence in proximity to the proposed route addition would continue the existing risk of vehicles spreading this weed species across the Forest. However, this risk is reduced by the prohibition of cross-country travel.

Table 84. Sensitive species within 500 feet of proposed routes under alternative 4

Route	Species	Miles	Within 30 feet	Within 100 feet	Acres within 100 feet
Proposed trails	None	0			0
Proposed roads	None	0			0
Proposed dispersed recreation site access	None	0			0
Total Miles		0			0

Special Management Areas: There are no proposed routes in SIAs or special habitat areas for plants under this alternative.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Changes include: (1) Vehicle class on portions or all of 25 roads would be changed from highway-legal only, to both highway-legal and nonhighway-legal allowed (allow mixed use); (2) vehicle class on portions or all of seven roads would be changed from both highway-legal and nonhighway-legal, to highway-legal only allowed (prohibit mixed use); (3) no currently closed roads would be opened. There would be no direct or indirect effects from changes in vehicle class.

Cumulative Effects

This alternative added to the ongoing and foreseeable road-related activities would result in a prohibition of cross-country travel on 508,000 acres of available lands, the addition eight miles of ML 1 roads and 103 miles of ML 2 roads and motorized trails and to the NFTS, decommissioning of 16 miles of road, and designation of two areas where cross-country travel is allowed (65 acres). The routes and areas proposed for designation under this alternative already exist and are being used. There will be no change from the current situation regarding the potential for impacts to botanical resources on these routes. Negative impacts to rare plants and their habitats from other management activities are minimized by conducting botany surveys prior to project implementation, and flagging and avoiding all rare plant occurrences. The risk of impacts to rare plants is reduced by eliminating motorized use from 508,000 acres and 430 miles of existing, unauthorized motorized routes. The cumulative effect of these activities should be beneficial.

Determinations of Effects of Alternative 4 for Species Considered

Beneficial: All species.

All species will benefit by the reduced amount of motorized use resulting from the prohibition of cross-country travel and the designation of a limited number of currently unauthorized routes under this alternative.

Alternative 5 – Maximize Motorized Recreation Opportunities

Alternative 5 responds to issue 1 (access and motorized recreation opportunity). This alternative is based on corrections to the proposed action (alternative 6) and proposes additional routes and mixed use to provide for more access and motorized recreation opportunity.

Indicators

- Acres available for cross-country travel: 53
- Miles of proposed roads/motorized trails within 100 feet of rare plant sites: 0.40
- Acres of rare plant sites within 100 feet of proposed roads/motorized trails: 2.08
- Miles of proposed roads/motorized trails in special management areas with sensitive plant species: 0
- Miles/acres of weeds within 100 feet of proposed roads/motorized trails: 1.84/21.24

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Prohibiting cross-country travel would discontinue vehicle use over 508,000 acres of the Forest. The potential for disturbance to or loss of rare plants from motorized vehicles would be eliminated for these acres.

Over the long term, through decompaction of substrate and the return of native vegetation, disturbed sites could regenerate sufficiently to support native plant communities.

Direct and Indirect Effects of Adding Facilities to the NFTS

Under this alternative, 206 unauthorized routes would be added to the NFTS as roads to access dispersed recreation sites; 29 unauthorized routes would be added to the NFTS as roads to provide a diversity of motorized recreation opportunities. Thirty-three unauthorized routes would be added to the NFTS as motorized trails. Two motorized areas would be added under this alternative.

Two sensitive species occur within 30 and 100 feet of dispersed recreation site access routes. One of these, *Thermopsis robusta*, tolerates disturbance well. Disturbance may create habitat or facilitate germination. *Meesia uliginosa* grows in fens and is not likely to be disturbed if vehicles remain on designated routes.

Alternative 5 proposes two areas for OHV use off designated routes: Humbug and Juniper Flats. There are no sensitive plants within 500 feet of either site; sensitive plants would not be affected by motorized use in these areas. Motorized use would directly impact the plant communities in these two areas. Direct effects to plant communities may be expected to include damage to native plants, destruction of native plants, elimination of biotic soils and alterations in the composition, structure and function of plant communities. Indirect effects to plant communities may include increased erosion, reduced

vegetation cover which could change microsite environmental conditions, increased dust and introduction of weeds to the areas. Given the level of disturbance in these areas, it is possible that weeds would not be able to establish and spread. No weeds are known to occur at Juniper Flat. Small patches of yellow starthistle occur at the Humbug site. This species has become so widespread on the KNF that the Forest has made the decision to treat it only in certain areas, such as entrances to wilderness. Any weeds that do establish in either area could be transported to other locations on the Forest.

Special Management Areas: There are no effects to species in Special Management Areas.

Direct and Indirect Effects to Changes in Existing Season and Class of Use

(1) Vehicle class on portions or all of 33 roads would change from highway-legal only, to both highway-legal and nonhighway-legal allowed (allow mixed use); (2) vehicle class on portions or all of seven roads would change from both highway-legal and nonhighway-legal, to highway-legal only allowed (prohibit mixed use); (3) one currently closed ML 1 road would be opened (41S10). There are no sensitive species or weeds within 100 feet of 41S10.

Table 85. Sensitive species within 500 feet of proposed routes under alternative 5

Route	Species	Miles	Within 30 feet	Within 100 feet	Acres within 100 feet
Proposed trails	None	0			
Proposed roads		0			
8Q01.3	*Mimulus evanescens*	1.49			
Proposed dispersed recreation site access					
52-06	*Thermopsis robusta*	0.28	X	X	1.34
52-13	*Eriogonum hirtellum*	0.04			
55-64	*Ptilidium californicum*	0.04			
57-13	*Meersia uliginosa*	0.12	X	X	0.74
57-13A	*Meersia uliginosa*	0.04			
57-21	*Calochortus greenei*	0.02			
Total		0.54			
Grand total		2.03			2.08

Table 86. Acres of known sensitive species sites within 500 feet of proposed routes under alternative 5

Species	Proposed Trails	Proposed Roads	Proposed Dispersed Recreation Site Access
Calochortus greenei			0.41
Eriogonum hirtellum			0.28
Meesia uliginosa			12.62
Mimulus evanescens		1.49	
Ptilidium californicum			0.55
Thermopsis robusta			7.38
Total		1.49	21.24
Grand Total			22.73

Cumulative Effects

This alternative added to the ongoing and foreseeable road-related activities would result in a prohibition of cross-country travel on 508,000 acres of available lands, the addition eight miles of ML 1 roads and 103 miles of ML 2 roads and motorized trails and to the NFTS, decommissioning of 16 miles of road, and designation of two areas where cross-country travel is allowed (65 acres). The routes and areas proposed for designation under this alternative already exist and are being used. There will be no change from the current situation regarding the potential for impacts to botanical resources on these routes. Negative impacts to rare plants and their habitats from other management activities are minimized by conducting botany surveys prior to project implementation, and flagging and avoiding all rare plant occurrences. The risk of impacts to rare plants is reduced by eliminating motorized use from 508,000 acres and 368 miles of existing, unauthorized motorized routes. The cumulative effect of these activities should be beneficial.

Determinations of Effects of Alternative 5 for Species Considered

May impact individuals but not likely to result in a trend toward federal listing or loss or viability: *Meesia uliginosa.*

No impact: *Mimulus evanescens.*

Beneficial: *Calochortus greenei, Calochortus persistens, Chaenactis suffrutescens, Cypripedium fasciculatum, Cypripedium montanum, Draba carnosula, Eriogonum alpinum, Eriogonum hirtellum, Helodium blandowii, Horkelia hendersonii, Ivesia pickeringii, Lupinus lepidatus var. ashlandensis, Meesia triquetra, Minuartia stolonifera, Pedicularis howellii, Phacelia cookei, Phacelia greenei, Phaeocollybia olivacea, Ptilidium californicum, Raillardella pringlei, Rorippa columbiae, Smilax jamesii, Tauschia howellii,* and *Thermopsis robusta.*

Two species are within 100 feet of a proposed route under alternative 5: *Meesia uliginosa*, and *Thermopsis robusta*. *Meesia uliginosa* is not likely to be directly affected but may experience some indirect effects of motorized use. *Thermopsis robusta* tolerates disturbance well. Disturbance may create habitat or facilitate germination. The *Mimulus evanescens* site is historic, and though searched for on an annual basis, the species has not been found in five to ten years. The other species are either more common, or if imperiled or critically imperiled, they are not within 100 feet of routes. The remaining species will benefit from the prohibition on cross-country travel.

Alternative 6 – Refined Proposed Action

The original proposed action (alternative 2) was developed to meet the purpose and need described in the October 7, 2008, Notice of Intent. Further field reconnaissance and a few administrative errors led to refinement of the proposed action. These refinements are captured in alternative 6.

Indicators

- Acres available for cross-country travel: 53
- Miles of proposed roads/motorized trails within 100 feet of rare plant sites: 0.40
- Acres of rare plant sites within 100 feet of proposed roads/motorized trails: 2.08
- Miles of proposed roads/motorized trails in special management areas with sensitive plant species: 0
- Miles/acres weeds within 100 feet of proposed roads/motorized trails: 1.90/21.17
- Total miles available for motorized use: 2,507

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Prohibiting cross-country travel would discontinue vehicle use over 508,000 acres of the Forest. The potential for disturbance to or loss of rare plants from motorized vehicles, as described under alternative 1, would be eliminated for these acres.

Over the long term, through decompaction of substrate and the return of native vegetation, disturbed sites could regenerate sufficiently to support native plant communities.

Direct and Indirect Effects of Adding Facilities to the NFTS

Under this alternative, 164 unauthorized routes would be added to the NFTS as roads to access dispersed recreation sites; 26 unauthorized routes would be added to the NFTS as roads to provide a diversity of motorized recreation opportunities. Thirty unauthorized routes would be added to the NFTS as motorized trails. Two motorized areas would be added under this alternative.

Two sensitive species occur within 30 and 100 feet of dispersed recreation site access routes. One of these, *Thermopsis robusta*, tolerates disturbance well. Disturbance may create habitat or facilitate germination. *Meesia uliginosa* grows in fens and is not likely to be disturbed if vehicles remain on designated routes.

Alternative 6 proposes two areas for OHV use off designated routes: Humbug and Juniper Flats. There are no sensitive plants within 500 feet of either site; sensitive plants would not be affected by motorized use in these areas. Motorized use would directly impact the plant communities in these two areas. Direct effects to plant communities may be expected to include damage to native plants, destruction of native plants, elimination of biotic soils and alterations in the composition, structure and function of plant communities. Indirect effects to plant communities may include increased erosion, reduced vegetation cover which could change microsite environmental conditions, increased dust and introduction of weeds to the areas. Given the level of disturbance in these areas, it is possible that weeds would not be able to establish and spread. No weeds are known to occur at Juniper Flat. Small patches of yellow

starthistle occur at the Humbug site. This species has become so widespread on the KNF that the Forest has made the decision to treat it only in certain areas, such as entrances to wilderness. Any weeds that do establish in either area could be transported to other locations on the Forest.

Special Management Areas: There are no impacts to species in special management areas.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

(1) Vehicle class on portions or all of 21 roads would be changed from highway-legal only, to both highway-legal and nonhighway-legal allowed (allow mixed use); (2) vehicle class on portions or all of seven roads would be changed from both highway-legal and nonhighway-legal, to highway-legal only allowed (prohibit mixed use); (3) one currently closed ML 1 road would be opened (41S10). There are no sensitive species or weeds within 100 feet of 41S10.

There are no effects on botanical resources from this action.

Table 87. Sensitive species within 500 feet of proposed routes under alternative 6

Route	Species	Miles	Within 30 feet	Within 100 feet	Acres within 100 feet
Proposed trails	None	0			
Proposed roads					
8Q01.3	*Mimulus evanescens*	0.09			
Proposed dispersed recreation site access					
52-06	*Thermopsis robusta*	0.28	X	X	1.34
52-13	*Eriogonum hirtellum*	0.04			
55-64	*Ptilidium californicum*	0.04			
57-13	*Meesia uliginosa*	0.12	X	X	0.74
57-21	*Calochortus greenei*	0.02			
Total		0.60			
Grand Total		0.59			2.08

Table 88. Acres of known sensitive species sites within 500 feet of proposed routes

Species	Proposed Trails	Proposed Roads	Proposed Dispersed Recreation Site Access
Calochortus greenei			0.41
Eriogonum hirtellum			0.28
Meesia uliginosa			11.25
Mimulus evanescens		1.49	
Ptilidium californicum			0.55
Thermopsis robusta			7.38
Total		1.49	19.87
Grand Total			21.36

Cumulative Effects

This alternative added to the ongoing and foreseeable road-related activities would result in a prohibition of cross-country travel on 508,000 acres of available lands, adding eight miles of ML 1 roads and 103 miles of ML 2 roads and motorized trails and to the NFTS, decommissioning 16 miles of road, and designating two areas where cross-country travel is allowed (65 acres). The routes and areas proposed for designation under this alternative already exist and are being used. There will be no change from the current situation regarding the potential for impacts to botanical resources on these routes. Negative impacts to rare plants and their habitats from other management activities are minimized by conducting botany surveys prior to project implementation, and flagging and avoiding all rare plant occurrences. The risk of impacts to rare plants is reduced by eliminating motorized use from 508,000 acres and 378 miles of existing, unauthorized motorized routes. The cumulative effect of these activities should be beneficial.

Determinations of Effects of Alternative 6 on Species Considered

May impact individuals but not likely to result in a trend toward federal listing or loss or viability: *Meesia uliginosa.*

No impact: *Mimulus evanescens*.

Beneficial: *Calochortus greenei, Calochortus persistens, Chaenactis suffrutescens, Cypripedium fasciculatum, Cypripedium montanum, Draba carnosula, Eriogonum alpinum, Eriogonum hirtellum, Helodium blandowii, Horkelia hendersonii, Ivesia pickeringii, Lupinus lepidatus var. ashlandensis, Meesia triquetra, Minuartia stolonifera, Pedicularis howellii, Phacelia cookei, Phacelia greenei, Phaeocollybia olivacea, Ptilidium californicum, Raillardella pringlei, Rorippa columbiae, Smilax jamesii, Tauschia howellii,* and *Thermopsis robusta..*

Two species are within 100 feet of a proposed route under alternative 6: *Meesia uliginosa*, and *Thermopsis robusta*. *Meesia uliginosa* is not likely to be directly affected but may experience some indirect effects of motorized use. *Thermopsis robusta* tolerates disturbance well. Disturbance may create habitat or facilitate germination. The *Mimulus evanescens* site is historic and though searched for on an annual basis, the species has not been found in five to ten years. The other species are either more common, or if imperiled or critically imperiled, they are not within 100 feet of routes.

Summary of Effects Analysis across All Alternatives

Impacts to rare plants and their habitats vary across all alternatives, and no alternative completely eliminates adverse effects to rare plants. In general, alternatives with fewer acres available for cross-country travel, and fewer miles of routes open for public wheeled motor vehicle use show reduced effects to rare plants and their habitats. Alternative 1 has the greatest negative effect on rare species and habitats, primarily due to the allowance of cross-country travel, which has the potential to affect all but the most inaccessible rare species and habitats. The effects of alternatives 5 and 6 are similar. Alternative 5 allows use of ten miles more than alternative 6. Over time this difference may result in greater disturbance and

more spread of noxious weeds. Alternative 2 is second to alternative 1 in total miles of routes available. Alternative 3, which designates no unauthorized routes, has the least impact on rare species. Alternative 4 proposes no new routes adjacent to rare plant sites and would have limited effects to botanical resources.

Table 89. Summary of alternatives

Proposed Action	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Cross-country travel	No change to current management	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Miles (#) of routes to access dispersed recreation sites	0	24 (258)	0	1.71 (25)	30.56 (206)	26.3 (164)
Miles (#) of routes added to provide a diversity of motorized recreation opportunities	0	54 (84)	0	4.45 (12)	16.69 (29)	14.58 (26)
Miles (#) of motorized trails added	0	14 (22)	0	0.73 (2)	21.77 (33)	18.42 (30)
Acres (# areas) of open to cross-country travel added	0	65 (2)	0	0	53 (2)	53 (2)
Miles (#) of mixed use routes allowed	0	88 (24)	0	119.25 (25)	277.77 (33)	105.21 (21)
Miles (#) of mixed use routes prohibited	0	10 (8)	0	7.66 (7)	7.66 (7)	7.66 (7)
Miles (#) of closed routes opened	0	9.96 (2)	0	0	4.66 (1)	4.66 (1)

Table 90. Comparison of botanical resource indicators

Indicators – Botanical Resources	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Acres available for cross-country travel	508,000	65 (2 areas)	0	0	53 (2 areas)	53 (2 areas)
Miles of unauthorized routes or proposed roads/trails within 100 feet of rare plant sites	5.22	0.12	0	0	2.13	0.69
Acres of rare plant sites within 100 feet of unauthorized routes or proposed roads/trails	50.55	0.74	0	0	2.47	2.47
Miles of unauthorized routes or proposed roads/trails in special management areas with sensitive species	0.16	0	0	0	0.0	0.0
Miles/acres of weed infestations within 100 feet of unauthorized routes or proposed roads/trails	3.21/54.50	0.87/12.15	0	0.19/1.23	1.84/21.24	1.90/21.17

Compliance with the Forest Plan and Other Direction

The proposed action alternatives are consistent with the Forest Plan and other direction. Under these alternatives, sensitive plant species will be monitored and site-specific action taken as needed to maintain viability. This is in compliance with the KNF LRMP goals to: "Maintain diverse and productive wildlife, fish, and sensitive plant habitats as an integral part of the ecosystem. Emphasize the maintenance or improvement of endangered, threatened and sensitive species habitat, species associations' habitat, and game species habitat" (USDA Forest Service 1995). This incorporates by reference the Route Risk Assessment for Botanical Species which is located in the project record. (See Botany BA/BE Appendix B: Route Risk Assessment for Botanical Species for Individual Mitigations).

The project was planned to avoid disturbance to sensitive species as much as possible. No mitigations are needed for any alternative. Sensitive species and associated habitat in the project area should be conserved by continuing the management regimes that have supported these species through their recent history, including any regular disturbance that has been part of that management. Inventory for new populations and monitoring of existing populations should continue as it has in the past, while in the accomplishment of other work as possible. Search for historic species should be guided by substrate analysis of known populations with particular attention to soil type and moisture source and permanence. Noxious weeds should be inventoried periodically and treated in accordance with Forest direction.

3.14 Non-native Invasive Species

3.14.1 Introduction

Vehicle travel is a major factor/vector in the introduction and spread of invasive plants, so this project affects the population and distribution of these species. Additionally, the former chief of the Forest Service determined that invasive species are one of four significant threats to forests and rangelands. The presence of these invaders affects many other resources, such as soil, wildlife habitat, and sensitive plants, so it is important to analyze and understand the effects of the project on noxious weed populations.

3.14.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action that is relevant to the management and prevention of noxious weeds includes:

FSM 2081.03 requires that a weed risk assessment be conducted when any ground disturbing activity is proposed. 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 (Fed. Reg. 1999) directs federal agencies to: prevent the introduction of invasive species; detect and respond rapidly to and control such species; not authorize, fund, or carry out actions that the agency 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.

Klamath LRMP Standards and Guidelines for Non-native plants and Weeds (USDA Forest Service 1995a)

Chapter 4, Management Direction

Forest-wide Standards and Guidelines

Timber management 21-53: all silvicultural practices shall consider how to best prevent introducing noxious or alien weeds… Certify, by the County Agricultural Department all straw, hay, and seeds used in mulching…as free of noxious weeds.

Specific Management Areas

MA2—Wilderness: 2-51: …Epidemic infestations (insects and disease) that severely threaten wilderness values… may be treated.

MA5—Special Areas: Late seral reserves (LSRs): 5-3: Nonnative species: In general, nonnative species (plant and animal) should not be introduced…Evaluate impacts of nonnative species (plant and animal) currently existing within reserves…plans and recommendations for eliminating or controlling nonnative species that are inconsistent with LSR objectives.

MA5—Special Areas: *Calochortus persistens*: Reduce or eliminate invasive, non-native weedy plant species that compete with *Calochortus persistens* for water, space, and nutrients.

MA16—Forage: 16-19: Activities that favor the establishment of undesirable native and non-native species should be avoided.

MA17—General Forest: 17-11: Silvicultural practices may include the following: site preparation…release and weeding.

Chapter 5 – Monitoring and Evaluation Requirements

Range Management: Noxious weeds:

Objective: Determine if noxious weeds have increased to damaging levels.

Technique: County weed inventory, mapping exercises

Frequency: Annually

Reporting: Annually

Standard: Infestation levels acceptable for management objectives

Variation requiring further action: Levels significantly rising.

3.14.3 Effects Analysis Methodology

The analysis of project effects on weed species was based on review of existing information including prior field visits and geographic information system (GIS) data. GIS data were used to determine numbers and acres of weed occurrences in proximity to existing and proposed routes and miles of existing and proposed routes in proximity to weed occurrences, and to analyze project effects. All data are in the project record. Two of those criteria relate to weeds:

- Close roads within 500 feet of a Class A pest populations to prevent spread.
- Assess roads and consider closure within 500 feet of a dyer's woad or star thistle population that is within one mile of a wilderness boundary.

Noxious Weed Species Considered

Noxious weeds and invasive exotic plants are collectively referred to as noxious or invasive weeds, plants, or species, or simply as weeds. Forest Service policy defines noxious weeds as: "those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease and being native or new to or not common to the United States or parts thereof (USDA Forest Service 1995b).

The noxious weed species considered in this analysis are invasive, nonnative plants that possess one or more of the characteristics of an invasive weed and are undesirable on Klamath National Forest (KNF) NFS lands (Table 91). Based on Executive Order 13112, issued in 1999, a species is considered invasive if it (a) is not 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 (Federal Register 1999). This analysis includes invasive plant species from the California Department of Food and Agriculture list of noxious weeds (CDFA 2007) and the Cal-IPC California Invasive Plant Inventory (Cal-IPC 2006). All weed species identified on the Forest are of concern with regard to their potential to spread and threaten native ecosystems. The Forest, however, has prioritized weed infestations for tracking based upon the aggressiveness of the weed species, the degree of regional concern, and feasibility of control. Some species are identified as lower priority for control efforts; they are less often mapped and are not specifically addressed in this analysis (i.e., cheatgrass). While it remains important to prevent the further spread of these species via management activities, control of all known infestations of these lower-priority species is not currently feasible, and they are likely to persist throughout the life of this project. This analysis focuses on the weed species known to occur adjacent to existing and proposed routes relevant to this project.

Geographic Area Evaluated

Direct and indirect effects to noxious weeds under each alternative will be analyzed within the geographic extents described below. Cumulative effects will be analyzed within the administrative boundaries of the Klamath National Forest.

Assumptions Specific to Analysis

In addition to those listed at the beginning of chapter 3 of the DEIS, the following assumptions were used in the analysis of noxious weeds:

1) This project is a ground-disturbing activity, which requires a weed risk assessment.
2) Existing weed infestations will continue to spread and the rate of spread will be increased by motorized vehicle activity. Infestations located along routes will spread further along the route. Motorized vehicles will bring in weed seeds and propagative parts from home areas and other areas where they have traveled.

3) Mixed use will not affect weed spread since there is no evidence that vehicle type affects seed vectoring.
4) Seasonal restrictions will have negligible effect on weed dispersal and spread since primary use will occur during the growing season.
5) The 100-foot buffer encompasses the distance that vehicles are allowed to drive off roads for parking and camping. In general, weed infestations located near proposed routes will have a high risk of spread to areas along the route and to other parts of the Forest.
6) Weed prevention measures will continue to be implemented for ground disturbing activities. Weed treatment will continue to occur.

3.14.4 Data Sources

- KNF GIS layers with routes and locations of noxious weed populations.
- Conversations with Marla Knight, KNF botanist, December 2008-May 2009.

3.14.5 Noxious Weeds Indicators

- Risk of noxious weed spread.

3.14.6 Noxious Weeds Methodology by Action

When completing the risk assessments, the following categories were assigned to determine the risk of noxious weed spread or introduction: high, medium, or low. These categories were assigned based on the following factors:

- A high risk of spread or introduction was assigned based on the presence of A-rated species (California Department of Agriculture) or invasive (high) by the California Invasive Plant Council) within 100 feet of unauthorized or proposed routes, or a high priority ranking on the KNF.
- The risk of spread was considered medium if known populations of B- or C-rated weed species occur within 100 feet of unauthorized or proposed routes.
- The risk of introduction or spread was considered low if existing inventories demonstrated that noxious weed populations were not present within 100 feet of unauthorized routes.

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

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Listed under each alternative.

Indicator(s): Listed under each alternative.

Methodology: GIS analysis and risk assessment based on criteria above.

2. Direct and indirect effects of adding facilities (presently unauthorized roads, trails, or areas) to the National Forest Transportation System (NFTS)

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Listed under each alternative.

Indicator(s): Listed under each alternative.

Methodology: GIS analysis and risk assessment based on criteria above.

3. Direct and indirect effects of changes in existing season and class of use

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: Listed under each alternative.

Indicator(s): Listed under each alternative.

Methodology: GIS analysis and risk assessment based on criteria above.

4. 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: Listed under each alternative.

Indicator(s): Listed under each alternative.

Methodology: GIS analysis and risk assessment based on criteria above.

3.14.7 Affected Environment/Environmental Consequences

Affected Environment

Thirty-six invasive plant species are of management concern for the Klamath National Forest. These weed species, which are known from about 996 locations, occupy a total area of approximately 8,675

acres. Of these known occurrences, 513 (51 percent) and 1773 acres (20 percent) are within 100 feet of an existing NFTS road (Table 92).

Table 91lists noxious weed species of concern on the KNF. Included in the table are the ratings from the KNF (USDA Forest Service 2008), California Department of Food and Agriculture's noxious weed list (CDFA 2007) and the California Invasive Plant Council's invasive plant inventory (Cal-IPC 2006). The KNF prioritizes weed species in three categories. High priority weeds are those that are limited in distribution, highly invasive, or not currently known to be present on the Forest. Treatment varies by location. Medium priority species are those that are generally common and treated on a case by case basis depending on location. Low priority species are widespread on the KNF or are not considered invasive. Low priority species are not usually treated unless they occur in a high priority area. The CDFA list divides noxious weeds into three categories: A, B, and C. **A** listed weeds are those for which eradication or containment is required at the State or county level. Eradication or containment of **B** listed weeds is at the discretion of the County Agricultural Commissioner, and **C** listed weeds require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner. NR = Not Rated. Cal-IPC categorizes invasive plants as high, moderate, or limited, based on the species' negative ecological, rather than economic or management, impact in California.

Table 91. Klamath National Forest noxious weed List

Scientific Name	Plants Code	Common Name(s)	KNF Priority	CDFA Rating	Cal-IPC Rating
Acroptilon repens (L.) DC.	ACRE3	Russian knapweed	H	B	Moderate
Ailanthus altissima	AIAL	Tree of Heaven	M	C	Moderate
Bromus tectorum L.	BRTE	Cheat grass	L	None	High
Cardaria draba (L.) Desv.	CADR	Heart-podded hoary cress, whitetop	M	B	Moderate
Cardaria chalapensis (L.) Hand.-Maz	CACH10	Lens-podded whitetop	M	B	Moderate
Carduus nutans L.	CANU4	Musk thistle	H	A	Moderate
Carduus pycnocephalus L.	CAPY2	Italian thistle Plumeless Italian thistle	H	C	Moderate
Centaurea diffusa Lam.	CEDI3	Diffuse knapweed, white knapweed	H	A	Moderate
Centaurea maculosa Lam.	CEMA4	Spotted knapweed	H	A	High
Centaurea debeauxii Gren. & Godr.	CEDE5	Meadow knapweed	H	A	Moderate
Centaurea solstitialis L.	CESO3	Yellow starthistle	M	C	High
Centaurea squarrosa Willd.	CESQ	Squarrose knapweed	H	A	Moderate
Chondrilla juncea L.	CHJU	Rush skeleton weed, hogbite	H	A	Moderate
Cirsium arvense (L.) Scop.	CIAR4	Canada thistle	M	B	Moderate
Cirsium vulgare	CIVU	Bull thistle	L	C	Moderate
Conium maculatum L.	COMA2	Poison hemlock	L	None	Moderate
Cynoglossum officinale L.	CYOF	Houndstongue	H	None	Moderate
Cytisus scoparius (L.) Link.	CYSC4	Scotch broom	H	C	High
Euphorbia esula L.	EUES	Leafy spurge	H	A	High
Genista monspessulana (L.) L. Johnson	GEMO2	French broom	H	C	High

Scientific Name	Plants Code	Common Name(s)	KNF Priority	CDFA Rating	Cal-IPC Rating
Hypericum perforatum L.	HYPE	Klamath weed, St. John's wort	L	C	Moderate
Isatis tinctoria L.	ISTI	Dyer's woad, Marlahan mustard	M	B	Moderate
Lepidium latifolium L.	LELA2	Perennial pepperweed, tall whitetop	H	B	High
Linaria dalmatica (L.) P. Mill ssp. dalmatica	LIDAD	Dalmation toadflax	H	A	Moderate
Lythrum salicaria L.	LYSA2	Purple loosestrife	H	B	High
Melilotus spp.	MEAL2 & MEOF	White sweetclover & Yellow sweetclover	L	None	None
Onopordum acanthium L.	ONAC	Scotch thistle, Cottonthistle	H	A	High
Onopordum tauricum Willd.	ONTA	Taurian thistle, Bull cottonthistle	H	A	None
Polygonum cuspidatum Sieb. & Zucc.	POCU6	Japanese knotweed	H	B	Moderate
Potentilla recta L.	PORE5	Sulphur cinquefoil	H	None	None
Rubus discolor	RUDI2	Himalayan blackberry	L	None	None
Salvia aethiopis L.	SAAE	Mediterranean sage	H	B	Limited
Sonchus arvensis	SOAR2	Perennial sow-thistle, Field sow-thistle	H	A	None
Spartium junceum	SPJU2	Spanish broom	H	C	High
Taenaiatherum caputmedusae	TACA8	Medusahead	L	C	High
Tribulus terrestris	TRTE	Puncture vine	H	C	None

A large portion of the KNF is relatively free of noxious weeds, with most infestations concentrated along roads or in areas of past and present disturbance. The lower elevations on the Forest and the mid-elevation valleys contain many of the noxious weed concentrations. These areas often provide entry points or “seed sources” for weeds moving into the less-invaded parts of the Forest.

Motorized vehicle travel both on and off of roads and trails has been a part of Forest recreation for many years. This activity has created a disturbed condition that greatly increases the vulnerability of the landscape to noxious weed invasion and spread. The KNF has been heavily influenced over the last 150 years by activities that include mining, livestock grazing, timber harvest, fire exclusion, large high-severity wildfires, and non-motorized recreational activities such as camping, hiking, biking, and horseback riding. The additive effects of recent and past actions have shaped the present landscape and corresponding noxious weed infestations.

Beyond these recent events, the effects of specific past management actions on noxious weed species are largely unknown. Targeted noxious weed surveys at the project level first began relatively recently (2000) on the Forest. While it is often difficult to draw definitive conclusions regarding the effects of past project activities on noxious weeds, the high level of past activity, combined with the current level of weed infestation, suggest that past activities have had a significant effect on noxious weed introduction and spread across the KNF.

Table 92. Summary of known noxious weeds within 100 feet of existing routes on the KNF

Scientific Name	Common name	# of Routes	KNF[a] Priority	CDFA[a] Rating	Cal-IPC[a] Rating	Miles	Acres
Cardaria chalapensis (L.) Hand.-Maz	Lens-podded whitetop	2	M	B	M	0.09	0.17
Cardaria draba (L.) Desv.	Heart-podded hoary cress, whitetop	5	M	B	M	0.46	1.40
Centaurea debeauxii Gren. & Godr.	Meadow knapweed	7	H	A	M	0.46	2.02
Centaurea maculosa Lam.	Spotted knapweed	23	H	A	H	2.62	9.92
Centaurea diffusa Lam.	Diffuse knapweed, white knapweed	14	H	A	M	2.67	63.61
Centaurea solstitialis L.	Yellow starthistle	164	M	C	H	98.81	904.67
Centaurea squarrosa Willd.	Squarrose knapweed	7	H	A	M	0.40	0.76
Cirsium arvense (L.) Scop.	Canada thistle	13	M	B	M	0.80	5.56
Cirsium vulgare	Bull thistle	1	L	C	M	0.21	4.03
Cytisus scoparius (L.) Link.	Scotch broom	35	H	C	H	0.40	95.66
Euphorbia esula L.	Leafy spurge	2	H	A	H	0.07	0.46
Genista monspessulana (L.) L. Johnson	French broom	3	H	C	H	0.09	0.15
Hypericum perforatum L.	Klamath weed, St. John's wort	8	L	C	M	0.95	8.34
Isatis tinctoria L.	Dyer's woad, Marlahan mustard	141	M	B	M	74.00	635.13
Lepidium latifolium L.	Perennial pepperweed whitetop	2	H	B	H	0.31	6.60
Linaria dalmatica (L.) P. Mill ssp. Dalmatica	Dalmatian toadflax	5	H	A	M	0.76	2.79
Onopordum acanthium L.	Scotch thistle, Cottonthistle	2	H	A	H	0.25	2.83
Taenaiatherum caputmedusae	Medusahead	2	L	C	H	0.76	23.60
Tribulus terrestris	Puncture vine	1	H	C	None	0.24	5.82
Total		**513**				**45.06**	**1773.52**

a - See discussion preceding Table 91 for a list of definitions.

Environmental Consequences

The following sections provide a discussion of the direct, indirect, and cumulative effects of each alternative on the spread of noxious weeds. It is important to note that the analysis below represents what is currently known about motorized vehicle impacts along existing unauthorized routes. No new NFTS road or trail construction is proposed under any of the alternatives. Routes described as "proposed" in the following discussion already exist on the ground as unauthorized routes, and are proposed for inclusion in the KNF travel management system. If included in the system, they will become NFTS designated routes. Designation of an existing unauthorized route may increase and concentrate motorized vehicle use on that route. Increased use has the potential to increase the risk of noxious weed introduction and spread. Routes, infestations, and mitigations or control measures will need to be re-evaluated on a continual basis to assess and address the risk from noxious weeds.

Alternative 1 – No Action

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The changes in use are as follow:

Short-term timeframe: 1 year. Noxious weeds would continue to spread through cross-country travel and continued use of unauthorized routes.

Long-term timeframe: 20 years. Noxious weeds would continue to spread through cross-country travel and continued use of unauthorized routes.

Spatial boundary: Areas of the KNF accessible to motor vehicles.

Table 93. Summary of indicator measures for alternative 1

Indicator Measure	Value
Miles of unauthorized or proposed routes within 100 ft. of known noxious weed sites (miles of dispersed recreation sites access)	1.81 (1.90)
Number of unauthorized or proposed routes within 100 ft. of noxious weed sites (Number of dispersed recreation sites access routes)	27 (34)
Acres of noxious weed sites within 100 ft. of unauthorized or proposed routes	33.26
Total number of noxious weed sites within 100 ft. of unauthorized or proposed routes (Number of sites along dispersed recreation sites access routes)	42 (194)
Number of unauthorized routes assigned “high risk” of noxious weed introduction or spread (Number dispersed recreation sites access routes with high risk)	18 (21)
Total miles of routes available for use	2848

Under this alternative, motor vehicles traveling cross-country and on unauthorized routes would continue to create areas of disturbance that are vulnerable to weed invasion, and carry weed seeds and other propagules to new locations (Ouren et al. 2007, Von der Lippe and Kowarik 2007). Noxious weeds would continue to reduce the quality of native plant communities by displacing native species, altering nutrient and fire cycles, degrading soil structure and decreasing the quality and availability of forage for wildlife (Mack et al. 2000). Under this alternative, all but the most inaccessible habitats would be at risk of noxious weed invasion and spread from cross-country motor vehicle travel.

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

There would be no additions of facilities under this alternative.

Short-term timeframe: 1 year. None

Long-term timeframe: 20 years. None

Spatial boundary: Areas of the KNF accessible to motor vehicles.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

There would be no changes in use under this alternative.

Short-term timeframe: 1 year. None

Long-term timeframe: 20 years. None

Spatial boundary: Areas of the KNF accessible to motor vehicles.

Table 94 shows miles of unauthorized routes within 100 feet of known weed sites in areas accessible to motor vehicles. Because they are not proposed for addition to the NFTS and they have not been mapped for this alternative, the dispersed recreation site access routes that are currently being used are not reflected in the mileage of unauthorized routes. Since those routes are currently being used, they are added here (in the totals section) to give a better representation of the actual mileage of unauthorized routes within 100 feet of known weed sites under alternative 1. See alternative 6 for descriptions of dispersed recreation site access routes and associated weeds.

Table 94. Miles of unauthorized routes within 100 feet of known weed sites in areas accessible to motor vehicles

Scientific Name	Common name	Routes	KNF Priority	CDFA[a] Rating	Cal-IPC[a] Rating	Miles	Acres
Acroptilon repens (L.) DC.	Russian knapweed	S-97.2	H	B	M	0.07	0.32
Cardaria chalapensis (L.) Hand.-Maz	Lens-podded whitetop	8J002.4	M	B	M	0.02	0.10
Centaurea solstitialis L.	Yellow starthistle	43N16.1 47N62.1 47N65.1 47N65.3 47N65.4 S-97.13A A12.1	M	C	H	0.51	3.18
Centaurea squarrosa Willd.	Squarrose knapweed	7J001.3 7J002.1	H	A	M	0.05	0.20
Cirsium arvense (L.) Scop.	Canada thistle	44N06Y.1A	M	B	M	0.02	6.80
Hypericum perforatum L.	Klamath weed, St. John's wort	S-97.1 S.97.12 S-97.12A	L	C	M	0.15	4.25
Isatis tinctoria L.	Dyer's woad, Marlahan mustard	45N28.7 44N03Y.2 7J031.7 S-97.11	M	B	M	0.21	2.39

Scientific Name	Common name	Routes	KNF Priority	CDFA[a] Rating	Cal-IPC[a] Rating	Miles	Acres
Lepidium latifolium L.	Perennial Pepperweed whitetop	S-97.1 S-97.12 S-97.12A	H	B	H	0.15	4.25
Linaria dalmatica (L.) P. Mill ssp. dalmatica	Dalmation toadflax	15.7 45N03C.2 45N03C.2A 5Q002.4	H	A	M	0.54	11.36
Onopordum acanthium L.	Scotch thistle, Cottonthistle	45N06Y.6 47N12B.1A	H	A	H	0.05	0.30
Potentilla recta L.	Sulphur cinquefoil	8J002.4	H	None	None	0.04	0.10
Total miles unauthorized routes						**1.81**	**33.26**
Known dispersed recreation sites access						**1.90**	
Total miles						**3.71**	

a - See discussion preceding Table 91 for a list of definitions.

Table 95. Alternative 1 risk ratings

Indicator	Low Risk	Medium Risk	High Risk
Number of routes within 100 feet of A-Listed weeds, high priority weeds on the KNF or weeds rated highly invasive (H) by Cal IPC (Number of dispersed recreation sites access routes)			18 (21)
Number of routes within 100 feet of B- or C-listed weed sites (without KNF high priority or Cal IPC highly invasive)		9 (9)	
Number of unauthorized routes with only weeds with a KNF low rating or a Cal-IPC rating of limited	3		
Total	**3**	**9 (9)**	**18 (21)**
Total including dispersed recreation sites access	**3**	**18**	**39**

Cumulative Effects

Boundaries for cumulative effects are as follows:

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: Forest.

Under this alternative, motorized vehicles traveling on and off of unauthorized routes would continue to trample, kill, and uproot native plant species. Indirect effects to native plants and plant communities

could include reduction of native plant cover, creation of edge-habitats, increased rutting, erosion, and soil compaction. One of the largest potential impacts from cross-country motorized travel is the increased risk of noxious weed introduction and spread. Noxious weeds reduce the quality of native (including rare plant) habitat by displacing native species, altering nutrient and fire cycles, degrading soil structure, and decreasing the quality and availability of forage for wildlife (Mack et al. 2000). Noxious weeds are spread by roads, motorized trails, recreational activities (such as camping, hiking, horseback riding, and hunting), and ongoing land management activities. Under this alternative, all but the most inaccessible habitats are at risk of noxious weed invasion and spread from cross-country motorized vehicle travel.

Many Forest activities such as livestock grazing, timber harvesting, recreational use, fuels treatments and fire suppression, road maintenance, and special uses may introduce noxious weeds to the Forest and create disturbed habitats in which they may become established. For a complete list of present and reasonably foreseeable Forest activities, refer to appendix B of this DEIS. Mitigations for these management activities would include activities such as pre-project weed surveys, flagging and avoiding noxious weed occurrences, washing vehicles and equipment prior to entering the Forest, using weed-free materials, minimizing ground disturbance, and restoring disturbed sites with native materials. Implementation of the National Strategy and Implementation Plan for Invasive Species Management (USDA Forest Service 2004) minimizes the risk of noxious weed introduction and spread associated with future foreseeable actions.

The additional effects of the no action alternative for noxious weeds would be a net increase of disturbed habitat due to cross-country motorized use, the probability that habitat disturbed by other Forest activities would remain disturbed for longer periods of time as OHV users drive in such areas, the augmented ability of weed propagules to travel quickly and distantly into and across the Forest, and the increased likelihood that whatever weeds do travel into or across the Forest would find amenable disturbed habitat into which they may be introduced. In sum, alternative 1 compounds the negative effects of other Forest projects upon soils and native plant communities. Implementation of alternative 1 would intensify, prolong, and augment the creation of noxious weed habitat and provide more opportunities for noxious weeds to be introduced and take advantage of these disturbed conditions. Under this alternative a total of 400 miles of unauthorized routes would continue to be used by motor vehicles. This would be combined with the 2,448 miles already established NFTS roads and trails for a total of 2,848 miles of routes available to motor vehicle use under alternative 1. There would also be a high risk of continuing proliferation of new user-created routes across the Forest.

Alternative 2 – Proposed Action

Alternative 2 includes the prohibition of cross-country motorized travel, proposes changes to the existing NFTS, and adds routes to the NFTS as described in the Notice of Intent (NOI) published October 7, 2008 (Volume 73, Number 195).

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Direct and indirect effects of alternative 2 are as follows:

Short-term timeframe: 1 year. Short-term direct and indirect effects would be beneficial as existing unauthorized motorized routes would be closed and the rate of spread of weeds would be slowed.

Long-term timeframe: 20 years. Over the long term, through decompaction of substrate and the return of native vegetation, suitable habitat could return to some areas with the potential to support native plant communities. Continued treatment of noxious weeds will be critical. Without treatment, weeds would continue to spread, but may spread more slowly since cross-country travel would be prohibited. Prohibiting cross-country motor vehicle travel on many unauthorized routes would increase the chances for successful containment of some weed species and possible eradication of some small occurrences.

Spatial boundary: KNF lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 2.

Table 96. Summary of indicator measures for alternative 2

Indicator Measure	Value
Miles of unauthorized or proposed routes within 100 ft. of known noxious weed sites	0.87
Number of unauthorized or proposed routes within 100 ft. of noxious weed sites	18
Acres of noxious weed sites within 100 ft. of unauthorized or proposed routes	12.15
Total number of noxious weed sites within 100 ft. of unauthorized or proposed routes	91
Number of unauthorized or proposed routes assigned “high risk” of noxious weed introduction or spread	18
Total miles of routes available for use	2540

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

Short-term timeframe: 1 year. Noxious weeds would continue to spread. The rate of spread would be slowed since travel would be concentrated on fewer routes.

Long-term timeframe: 20 years. Weeds would continue to spread over the long term. Continued treatment of noxious weeds will be critical. Without treatment, weeds would continue to spread, but may spread more slowly since travel would occur only on designated routes. Limiting travel to proposed routes would concentrate noxious weeds, possibly making treatment easier.

Spatial boundary: KNF lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 2.

Under this alternative, 24 miles of unauthorized routes would be added to the NFTS as roads to access dispersed recreation sites; 54 miles of unauthorized routes would be added to the NFTS as roads to provide a diversity of motorized recreation opportunities.

Fourteen miles of unauthorized routes would be added to the NFTS as motorized trails, and two motorized areas (65 acres) would be added. This alternative proposes opening two ML 1 routes: 40N51 and 41S10. Sixteen proposed dispersed recreation site access routes are within 100 feet of known weed sites.

The addition of 92 miles of routes and 65 acres of open motorized areas to the NFTS roads would allow continued motor vehicle traffic within 100 feet of 91 documented occurrences of noxious weeds. The presence of noxious weed occurrences in proximity to proposed route additions would maintain the existing risk of vehicles spreading these weeds across the Forest. However, this risk is reduced by the prohibition of cross-country travel.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Short-term timeframe: 1 year. None

Long-term timeframe: 20 years. None

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 2.

Alternative 2 proposes changes to the NFTS. 1) Vehicle class on portions or all of 24 roads would be changed from highway-legal only, to both highway-legal and nonhighway-legal allowed (allow mixed use). 2) Vehicle class on portions or all of 8 roads would be changed from both highway-legal and nonhighway-legal, to highway-legal only allowed (prohibit mixed use). 3) Two ML 1 roads would be opened: 40N51 and 41S10. Since development of this alternative, 40N51 has been classified as open. Neither road is within 100 feet of noxious weed sites.

Table 97. Weed sites within 100 feet of proposed routes under alternative 2

Scientific Name (Jepson, 1993)	Common name	Routes	KNF Priority	CDFA[a] Rating	Cal-IPC[a] Rating	Miles	Acres
Centaurea debeauxii Gren. & Godr.	Meadow knapweed	52-12 52-13	H	A	M	0.04	0.09
Centaurea maculosa Lam.	Spotted knapweed	54-10 54-12 54-17 55-18	H	A	H	0.19	1.95
Centaurea solstitialis L.	Yellow starthistle	47N65.4 51-26 51-33 52-12 52-20 54-17 54-44 54-47 54-48	M	C	H	0.35	6.14
Cytisus scoparius (L.) Link.	Scotch broom	52-20 55-13 55-14	H	C	H	0.10	2.01
Isatis tinctoria L.	Dyer's woad, Marlahan mustard	44N03Y.2 51-33 52-12 52-13 55-26 55-28	M	B	M	0.19	1.96
Total miles						**0.87**	**12.15**

a - See discussion preceding Table 91 for a list of definitions.

Table 98. Alternative 2 risk ratings

Indicator	Low Risk	Medium Risk	High Risk
Number of routes within 100 feet of A-Listed weeds, high priority weeds on the KNF or weeds rated highly invasive (H) by Cal IPC			18
Number of routes within 100 feet of B- or C-listed weed sites (without KNF high priority or Cal IPC highly invasive)		6	
Number of unauthorized routes with only weeds with a KNF low rating or a Cal-IPC rating of limited	0		
Total	**0**	**6**	**18**

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: Forest.

The cumulative effects from Forest management and use activities are the same for alternative 2 as for alternative 1. For a complete discussion refer to the alternative 1 cumulative effects section. For a complete list of present and reasonably foreseeable forest management activities, refer to appendix B of this DEIS.

Travel off NFTS roads would be prohibited in this alternative, which would greatly reduce the risk of noxious weed introduction and spread across the Forest. In comparison to the no action alternative, the proposed action has a greatly reduced risk of weed spread from any new infestations that might occur with timber harvest, grazing, prescribed burning, or wildfire activities, as well as other Forest management and use activities impacting lands away from NFTS roads. Future ground disturbing projects would also be less susceptible to the introduction of new weed propagules or to continued disturbance due to OHV use. Restriction of motorized travel cross-country would eliminate OHV disturbance off NFTS roads. Removal of cross-country travel would favor native perennial grasses and forbs and generally late-seral (late-stage ecological succession) native vegetation, which is better able to resist weed invasion (Gelbard and Harrison 2005). Under alternative 2 a total of 0.87 miles of routes infested with known noxious weed occurrences would be added to the NFTS. These 91 known occurrences have a total area of 12.15 acres. Under this alternative, a total of 2,540 NFTS routes would be open for motor vehicle use.

Alternative 3 – Cross-country Travel Prohibition Only- No Changes to the Current NFTS

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Short-term timeframe: 1 year. Short-term direct and indirect effects would be beneficial as use of existing unauthorized routes would end and the rate of spread of weeds would be slowed.

Long-term timeframe: 20 years. Over the long-term, through decompaction of substrate and the return of native vegetation, suitable habitat could return to some areas with the potential to support native plant communities. Continued treatment of noxious weeds will be critical. Without treatment, weeds would continue to spread, but may spread more slowly since travel would be concentrated on designated routes. Prohibition of cross-country motor vehicle travel on many unauthorized routes would increase the chances for successful containment of some weed species and possible eradication of some small occurrences.

Spatial boundary: Areas open to motorized use on the KNF.

Alternative 3 prohibits cross-country travel off NFTS roads, adds no unauthorized routes to the NFTS, and does not change use restrictions on existing NFTS roads. Under alternative 3, potential spread by motor vehicles from existing noxious weed occurrences within 100 feet of unauthorized routes would

be eliminated. Under this alternative, motor vehicle traffic would be confined to NFTS routes, which would greatly reduce the potential for creating noxious weed habitat through ground disturbance. It would also greatly reduce the potential for spreading noxious weeds from existing populations. Routes open under alternative 3 are NFTS roads and trails that would be available for use under all alternatives.

Table 99. Summary of indicator measures for alternative 3

Indicator Measure	Value
Miles of unauthorized or proposed routes within 100 feet of known noxious weed sites	0
Number of unauthorized or proposed routes within 100 ft of noxious weed sites	0
Acres of noxious weed sites within 100 feet of unauthorized or proposed routes	0
Total number of noxious weed sites within 100 feet of proposed routes	0
Number of unauthorized routes assigned “high risk” of noxious weed introduction or spread	0
Total miles of routes available for use	**2448**

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

Short-term timeframe: 1 year. None. No new facilities would be added under this alternative.

Long-term timeframe: 20 years. None. No new facilities would be added under this alternative.

Spatial boundary: KNF lands within 100 feet of NFTS routes.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Short-term timeframe: 1 year. None. There would be no changes to the NFTS.

Long-term timeframe: 20 years. None. There would be no changes to the NFTS.

Spatial boundary: KNF lands within 100 feet of NFTS routes.

No maintenance level 3 roads would be open to mixed use, so there would be no change in weed risk from mixed use.

Table 100. Alternative 3 risk ratings

Indicator	Low Risk	Medium Risk	High Risk
Number of A-Listed weed sites, high priority on the KNF or rated highly invasive (H) by Cal IPC within 100 feet of unauthorized or proposed routes	0		
Number of B- or C-listed weed sites within 100 feet of unauthorized or proposed routes and without high priority on the KNF or highly invasive Cal IPC rating	0		
Number of unauthorized routes with only weeds with a KNF rating of low or a Cal IPC rating of limited	0		
Total	**0**		

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: Forest.

The cumulative effects from Forest management and use are the same for alternative 3 as for the no action and proposed action alternatives. A complete discussion can be found in the alternative 1 cumulative effects section. The additional effects from alternative 3 from the prohibition of cross-country travel would be the same as for alternative 2, described above. The difference in cumulative effects for alternative 3 is that no unauthorized routes would be added to the NFTS. This would eliminate vehicle travel through the known noxious weed occurrences located along unauthorized routes. This alternative would therefore have the lowest risk of noxious weed introduction and spread. Under this alternative, no unauthorized routes with known weed occurrences would be added to the NFTS, and a total of 2,448 miles of NFTS routes would be open for motorized use.

Alternative 4 – Maximize Quiet Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Short-term timeframe: 1 year. Short-term direct and indirect effects would be beneficial as use of existing unauthorized routes would discontinue and the rate of spread of weeds would be slowed.

Long-term timeframe: 20 years. Over the long term, through decompaction of substrate and the return of native vegetation, suitable habitat could return to some areas with the potential to support native plant communities. Continued treatment of noxious weeds will be critical. Without treatment, weeds would continue to spread, but may spread more slowly since cross-country travel would be prohibited. Prohibiting cross-country motor vehicle travel on many unauthorized routes would increase the chances for successful containment of some weed species and possible eradication of some small occurrences.

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 4.

Table 101. Summary of indicator measures for alternative 4

Indicator Measure	Value
Miles of unauthorized or proposed routes within 100 feet of known noxious weed sites	0.19
Number of unauthorized or proposed routes within 100 ft of noxious weed sites	2
Acres of noxious weed sites within 100 feet of unauthorized or proposed routes	1.33
Total number of noxious weed sites within 100 feet of proposed routes	2
Number of unauthorized routes assigned “high risk” of noxious weed introduction or spread	1
Total miles of routes available for use	2540

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

Short-term timeframe: 1 year. Noxious weeds would continue to spread. The rate of spread would be slowed considerable since fewer routes would be open for use.

Long-term timeframe: 20 years. Noxious weeds would continue to spread. Continued treatment of noxious weeds will be critical. Without treatment, weeds would continue to spread, but may spread more slowly since travel would be concentrated on designated routes. Limiting travel to designated routes would concentrate noxious weeds, possibly making treatment easier.

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 4.

Alternative 4 would prohibit cross-country travel off NFTS roads. It would add 1.71 miles of unauthorized routes to the NFTS as roads to access dispersed recreation sites; 4.45 miles of unauthorized routes would be added to the NFTS as roads to provide a diversity of motorized recreation opportunities, and 0.73 miles of unauthorized routes would be added to the NFTS as motorized trails. No motorized areas would be added under this alternative.

The addition of 6.89 miles of unauthorized routes to the NFTS roads would allow continued motor vehicle traffic within 100 feet of one (1.23 acres) documented occurrence of a noxious weed. The presence of the noxious weed occurrence in proximity to the proposed route addition would continue the existing risk of vehicles spreading this weed species across the Forest. However, this risk is reduced by prohibiting cross-country travel.

Table 102. Weed sites within 100 feet of proposed routes under alternative 4

Scientific Name	Common name	Routes	KNF[a] Priority	CDFA[a] Rating	Cal-IPC[a] Rating	Miles	Acres
Isatis tinctoria L.	Dyer's woad, Marlahan mustard	55-26	M	B	M	0.19	1.23
Total						**0.19**	**1.23**

a - See discussion preceding Table 91 for a list of definitions.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Short-term timeframe: 1 year. None

Long-term timeframe: 20 years. None

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 4.

Reclassification of existing NFTS roads to allow mixed vehicle use is not expected to have any effect on noxious weed risk, since there is no available evidence indicating that type of vehicle affects the risk of weed introduction or spread on established roads. The greatest reduction in weed risk in alternative 4, relative to alternative 1, would come from the prohibition of cross-country motor vehicle travel.

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: Forest.

The cumulative effects from Forest management and use are the same for alternative 4 as for the no action and proposed action alternatives, and a complete discussion can be found in the alternative 1 cumulative effects section. The additional effect for alternative 4 from the prohibition of cross-country travel would be the same as for alternative 2, described above. Under this alternative, one route adjacent to weeds would be added to the NFTS, and a total 2,455 mile of NFTS routes would be open to motorized use.

Table 103. Alternative 4 risk ratings

Indicator	Low Risk	Medium Risk	High Risk
Number of unauthorized or proposed routes within 100 feet of A-Listed weeds, high priority weeds on the KNF or weeds rated highly invasive (H) by Cal IPC			0
Number of B- or C-listed weed sites within 100 feet of unauthorized or proposed routes and without high priority on the KNF or highly invasive Cal IPC rating		1	
Number of unauthorized or proposed routes with only weeds with a KNF rating of low or a Cal IPC rating of limited	0		
Total	**0**	**1**	**0**

Alternative 5 – Maximize Motorized Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Short-term timeframe: 1 year. Short-term direct and indirect effects would be beneficial as use of existing unauthorized routes would discontinue and the rate of spread of weeds would be slowed.

Long-term timeframe: 20 years. Over the long term, through decompaction of substrate and the return of native vegetation, suitable habitat could return to some areas with the potential to support native plant communities. Continued treatment of noxious weeds will be critical. Without treatment, weeds would continue to spread, but may spread more slowly since travel would be concentrated on designated routes. Prohibiting cross-country motor vehicle travel on many unauthorized routes would increase the chances for successful containment of some weed species and possible eradication of small occurrences.

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under Alternative 5.

Table 104. Summary of indicator measures for alternative 5

Indicator Measure	Value
Miles of unauthorized or proposed routes within 100 ft. of known noxious weed sites	1.84
Number of unauthorized or proposed routes within 100 ft of noxious weed sites	24
Acres of noxious weed sites within 100 ft. of unauthorized or proposed routes	21.24
Total number of noxious weed sites within 100 ft. of proposed routes	183
Number of unauthorized routes assigned “high risk” of noxious weed introduction or spread	23
Total miles of routes available for use	**2517**

Alternative 5 would add more routes and miles to aid access to OHV routes. The direct, indirect, and cumulative effects of alternative 5 on noxious weeds are predicted to be slightly higher than those of alternative 2, due to the slightly higher numbers of known noxious weeds and infested routes (Table 104).

Table 105. Weeds within 100 feet of proposed routes under alternative 5

Scientific Name	Common name	Routes	KNF[a] Priority	CDFA[a] Rating	Cal-IPC[a] Rating	Miles	Acres
Centaurea debeauxii Gren. & Godr.	Meadow knapweed	52-13	H	A	M	0.02	0.09
Centaurea diffusa Lam.	Diffuse knapweed, white knapweed	52-10a	H	A	M	0.21	0.40
Centaurea maculosa Lam.	Spotted knapweed	54-07 54-08 54-10 54-11 54-12 54-17 55-18	H	A	H	0.25	2.05
Centaurea solstitialis L.	Yellow starthistle	51-05 51-25 51-26 51-33 52-04 52-12 54-17 52-20 54-44 54-46a 54-47 54-48	M	C	H	1.05	14.78
Cytisus scoparius (L.) Link.	Scotch broom	55-13 55-14	H	C	H	0.17	2.01
Isatis tinctoria L.	Dyer's woad, Marlahan mustard	51-05 51-25 51-26 51-33 52-13 55-04 55-26 55-28	M	B	M	0.14	1.91
Total miles						**1.84**	**21.24**

a - See discussion preceding Table 91 for a list of definitions.

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

Short-term timeframe: 1 year. Noxious weeds would continue to spread along open routes.

Long-term timeframe: 20 years. Noxious weeds would continue to spread. Continued treatment of noxious weeds would be critical. Without treatment, weeds would continue to spread, but may spread

more slowly since travel would be confined to designated routes. Limiting travel to designated routes would concentrate noxious weeds, possibly making treatment easier.

Spatial boundary: KNF lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 5.

Under alternative 5, a total of 30.56 miles of unauthorized routes would be added to the NFTS as roads to access dispersed recreation sites; 16.69 miles of unauthorized routes would be added to the NFTS as roads to provide a diversity of motorized recreation opportunities, and 21.77 miles of unauthorized routes would be added to the NFTS as motorized trails. Two motorized areas would be added under this alternative (53 acres).

The addition of 69 miles of unauthorized routes and 53 acres of open motorized areas to the NFTS road system would allow continued motor vehicle traffic within 100 feet of 183 (21.24 acres) documented occurrences of noxious weeds. The presence of noxious weed occurrences in proximity to proposed route additions would continue the existing risk of vehicles spreading these weed species across the Forest. However, this risk is reduced by the prohibition of cross-country travel.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Short-term timeframe: 1 year. None

Long-term timeframe: 20 years. None

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 5.

Reclassification of existing NFTS roads to allow mixed vehicle use is not expected to have effects on noxious weed risk, since there is no available evidence indicating that type of vehicle affects the risk of weed introduction or spread on established roads. The greatest reduction in weed risk in alternative 5 would come from the prohibition of cross-country motor vehicle travel. Under this alternative, one ML 1 road (41S10) is proposed to be opened. There are no known weed sites within 100 feet of 41S10.

Table 106. Alternative 5 risk ratings for unauthorized routes

Indicator (number of unauthorized routes)	Low Risk	Medium Risk	High Risk
Number of unauthorized or proposed routes within 100 feet of A-Listed weeds, high priority weeds on the KNF or weeds rated highly invasive (H) by Cal IPC			23
Number of B- or C-listed weed sites within 100 feet of unauthorized or proposed routes and without high priority on the KNF or highly invasive Cal IPC rating		8	
Number of unauthorized routes with only weeds with a KNF rating of low or a Cal IPC rating of limited	0		
Total	**0**	**8**	**23**

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: Forest

The cumulative effects from Forest management and use are the same for alternative 5 as for the no action and proposed action alternatives, and a complete discussion can be found in the alternative 1 cumulative effects section. The additional effect of alternative 5 from the prohibition of cross-country travel would be the same as for alternative 2, described above. Under this alternative, 23 routes with known weed occurrences would be added to the NFTS, for a total of 2,517 miles of NFTS routes open to motor vehicle use.

Alternative 6 – Refined Proposed Action.

Direct and Indirect Effects of the Prohibition on Cross-country travel

Short-term timeframe: 1 year. Short-term direct and indirect effects would be beneficial as use of existing unauthorized routes would discontinue and the rate of spread of weeds would be slowed.

Long-term timeframe: 20 years. Over the long term, through decompaction of substrate and the return of native vegetation, suitable habitat could return to some areas with the potential to support native plant communities. Continued treatment of noxious weeds will be critical. Without treatment, weeds would continue to spread, but may spread more slowly since cross-country travel would be prohibited. Prohibiting cross-country motor vehicle travel on many unauthorized routes would increase the chances for successful containment of some weed species and possible eradication of some small occurrences.

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 6.

Table 107. Summary of indicator measures for alternative 6

Indicator Measure	Value
Miles of unauthorized or proposed routes within 100 ft. of known noxious weed sites	1.90
Number of unauthorized or proposed routes within 100 ft of noxious weed sites	24
Acres of noxious weed sites within 100 ft. of unauthorized or proposed routes	21.17
Total number of noxious weed sites within 100 ft. of proposed routes	177
Number of unauthorized routes assigned “high risk” of noxious weed introduction or spread	0
Total miles of routes available for use	2507

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

Short-term timeframe: 1 year. None

Long-term timeframe: 20 years. None

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 6.

Table 108. Weeds within 100 feet of proposed routes under alternative 6

Scientific Name (Jepson, 1993)	Common name	Routes	KNF[a] Priority	CDFA[a] Rating	Cal-IPC[a] Rating	Miles	Acres
Centaurea debeauxii Gren. & Godr.	Meadow knapweed	52-12 52-13	H	A	M	0.15	0.09
Centaurea maculosa Lam.	Spotted knapweed	54-07 54-08 54-10 54-11 54-12 54-17 55-18	H	A	H	0.25	2.05
Centaurea solstitialis L.	Yellow starthistle	51-05 51-25 51-26 51-33 52-04 52-12 54-17 52-20 54-44 54-46a 54-47 54-48	M	C	H	0.84	14.78
Cytisus scoparius (L.) Link.	Scotch broom	52-04 52-20 55-13 55-14	H	C	H	0.39	2.01
Isatis tinctoria L.	Dyer's woad, Marlahan mustard	51-05 51-25 51-26 51-33 52-12 52-13 55-04 55-26 55-28	M	B	M	0.27	2.23
Total miles						**1.90**	**21.17**

a - See discussion preceding Table 91 for a list of definitions.

Under alternative 6, 26.30 miles of unauthorized routes would be added to the NFTS as roads to access dispersed recreation sites; 14.58 miles of unauthorized routes would be added to the NFTS as roads to provide a diversity of motorized recreation opportunities, and 18.42 miles of unauthorized routes

would be added to the NFTS as motorized trails. Two motorized areas would be added under this alternative (53 acres).

The addition of 59 miles of unauthorized routes and 53 acres of open motorized areas to the NFTS road system would allow continued motor vehicle traffic within 100 feet of 177 (21.17 acres) documented occurrences of noxious weeds. The presence of noxious weed occurrences in proximity to proposed route additions would continue the currently present risk of vehicles spreading these weed species across the Forest. However, this risk is reduced by prohibiting cross-country travel.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Short-term timeframe: 1 year. None

Long-term timeframe: 20 years. None

Spatial boundary: KNF System lands within 100 feet of unauthorized routes proposed for addition to the NFTS under alternative 6.

Reclassification of existing NFTS roads to allow mixed vehicle use is not expected to have any effect on noxious weed risk, since there is no available evidence indicating that type of vehicle affects the risk of weed introduction or spread on established roads. The greatest reduction in weed risk in alternative 6, relative to alternative 1, would come from the prohibiting cross-country motor vehicle travel. Under this alternative, one maintenance level 1 road (41S10) is proposed to be opened. There are no known weed sites within 100 feet of 41S10.

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: Forest

The cumulative effects from Forest management and use are the same for alternative 6 as for the no action and proposed action alternatives, and a complete discussion can be found in the alternative 1 cumulative effects section. The additional effect of alternative 6 from prohibiting cross-country travel would be the same as for alternative 2, described above. Under this alternative, 24 routes with known weed occurrences would be added to the NFTS, for a total of 2,507 miles of NFTS routes open to motorized use.

Table 109. Alternative 6 risk ratings

Indicator	Low Risk	Medium Risk	High Risk
Number of unauthorized or proposed routes within 100 feet of A-Listed weeds, high priority weeds on the KNF or weeds rated highly invasive (H) by Cal IPC			21
Number of B- or C-listed weed sites within 100 feet of unauthorized or proposed routes and without high priority on the KNF or highly invasive Cal IPC rating		9	
Number of unauthorized or proposed routes with only weeds with a KNF rating of low or a Cal IPC rating of limited	0		
Total	**0**	**9**	**21**

Summary of Effects Analysis across All Alternatives

Table 110. Comparison of alternatives

Measure	Rankings of Alternatives for Each Indicator					
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Miles of routes added to the NFTS	0	92	0	6.89	69	59
Number of routes (unauthorized or proposed) within 100 ft of weed sites	29	18	0	2	23	24
Miles of routes (unauthorized or proposed) within 100 ft of known weed sites	1.81[a]/ 3.71b	0.87	0	0.19	1.84	1.90
Number of high risk routes (unauthorized or proposed)	18 [a] / 39 b	18	0	0	23	21
Acres of weed sites within 100 ft of routes (unauthorized or proposed)	33.26	12.15	0	1.33	21.24	21.17
Acres open for cross-country travel	408,000	65	0	0	53	53
Total number of noxious weed sites within 100 feet of unauthorized or proposed trails.	42 (194)	91	0	2	183	177
Total miles available for use	2848	2540	2448	2455	2517	2507

a - Total unauthorized routes
b - Total including known campground access

Alternative 1 has the greatest potential for introducing and spreading noxious weeds on the Forest, mainly due to the fact that it includes such a large area open to cross-country travel. Alternative 3 adds no new routes. Routes available for public use under alternative 3 are currently open in the NFTS. They will remain open for public use under all alternatives. Implementation of alternative 3 would have no effects on the introduction or spread of noxious weeds on the Forest. Alternative 4 adds 6.89 miles of new routes, two of which are known to have adjacent noxious weed sites. Implementation of alternative 4 would have minimal effects.

Alternatives 2, 5, and 6 would add more miles to the system and would potentially have more adverse effects than alternatives 3 and 4. The effects from implementation of alternatives 5 and 6 appear to be

similar. Alternative 6 would add more miles of routes within 100 feet of known weed sites. Alternative 5 adds more routes and more mileage to the NFTS. Although alternative 6 ranks slightly higher in the overall risk of weed spread, it is possible that over time, the system with more open roads is likely to have more weed infestations.

Implementation of any of the action alternatives would have beneficial effects relative to the current condition. All action alternatives prohibit cross-country travel; therefore, the risk of weed introduction and spread would be greatly reduced compared to the current situation (no action alternative).

Compliance with the Forest Plan and Other Direction

The proposed action alternatives are consistent with the Forest Plan and other direction. No mitigations are needed. Continued compliance with Forest protocols for noxious weed inventory and management will address noxious weed concerns.

3.15 Visual Resources

3.15.1 Introduction

This section of the Motorized Travel Management environmental analysis examines the extent to which alternatives respond to visual resources management direction established in the Klamath National Forest Land and Resource Management Plan (LRMP) and the Travel Management (TM) Rule. The LRMP visual resources direction was established under the implementing regulations of the National Forest Management Act (NFMA).

In the development of the Klamath National Forest's Land and Resource Management Plan (Forest Plan), the Forest's visual resources were inventoried to determine the landscape's 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 forest land areas. The VQOs establish minimum acceptable thresholds for landscape alterations from an otherwise natural-appearing forest landscape. For example, areas with a retention VQO are expected to retain a natural appearance; areas with a partial retention VQO may have some alterations, but they remain subordinate to the characteristic landscape; areas with a modification VQO can have alterations that do not look natural appearing.

Roads and trails create linear alterations in landscapes that can be mitigated through sound design. Unmitigated, they present uncharacteristic line qualities in forest landscapes. Landscapes with a dense canopy cover have the capability of masking these linear alterations; sparsely covered landscapes have less capability. The proliferation of unauthorized routes, particularly in sparsely covered landscapes, can adversely affect the Forest's visual resources.

3.15.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action as it affects visual resources includes:

National Forest Management Act (NFMA): The National Forest Management Act (NFMA), and its implementing regulations, required the inventory and evaluation of the Forest's 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 visual quality objectives.

Travel Management Rule: The TM Rule does not cite aesthetics specifically, but in the designation trails or areas, the responsible official shall consider effects on forest resources, with the objective of minimizing effects of motor vehicle use.

Klamath National Forest LRMP: The LRMP contains direction for visual resource management. On page 4-7, the LRMP states: Manage visual resources to conserve the natural scenic character of the

Forest. Meet the Forest Plan's adopted visual quality objectives (VQOs). Emphasize management of the visual resource seen from communities, high-use recreation areas and major roads and trails. Conserve the inherent scenic attractiveness of distinctive landscapes. Rehabilitate areas not currently meeting VQOs (USDA Forest Service, 1995).

The LRMP also contains forest-wide management direction in the form of visual quality objectives and specific management area direction for visual resources. Only the standards and guidelines or portions of standard and guidelines that apply to travel management are listed here. For the full list of forestwide standards and guidelines for visual resource management, see the LRMP, page 4-44 and 4-45. Visual Resources Standard and Guidelines from the LRMP that apply to travel management include:

11-1 – Visual Quality Objectives (VQOs) were developed using Agriculture Handbooks 462 and 559, which define nationally established principles and methods of the Visual Resource Management System. The VQOs are minimum conditions to be achieved as soon as possible in all management areas and within 3 years for all VQOs except preservation and maximum modification, which must be met immediately.

11-3 – Maintain the VQOs as designated. Where possible, and where compatible with other resource objectives, strive for higher visual quality standards. Visual objectives may be foregone in the short-term, following extreme natural events, in order to revegetate the area.

11-4 – Perpetuate the ecologically established landscape character when implementing management activities. Manage activities in accordance with VQOs to reflect the form, line, color, and texture of natural occurrences.

11-6 – State Highways 3, 96, 97 and Interstate 5 are potential State scenic highways which will be managed to maintain their eligibility. Manage to meet a retention VQO for foreground views in the viewshed, except for the Butte Valley National Grassland (BVNG), which will have a partial retention VQO for foreground views. Manage to meet a partial retention VQO for the middleground views in the viewshed.

11-8 – Areas not visible from inventoried high or moderate sensitivity viewpoints (level 1 and 2) shall be managed to appear as little modified as possible consistent with management goals, and no more altered in appearance than maximum modification (USDA Forest Service, 1995).

State Highways 3, 96, 97 and Interstate 5 listed above were identified as key viewsheds for this analysis. Highway 263, part of the State of Jefferson Scenic Byway, was identified as a key viewshed for this analysis. The number of key viewsheds impacted by proposed activities was used as an analysis indicator and is discussed further in the Effects Analysis Methodology section below.

In addition to the above forestwide standards and guidelines, each management area is assigned a VQO or a range of VQOs to guide decisions and resource management activities. The Forest VQO map,

shown in the following figure, was used in the effects analysis for this project. See the LRMP for standards and guidelines specific to each management area.

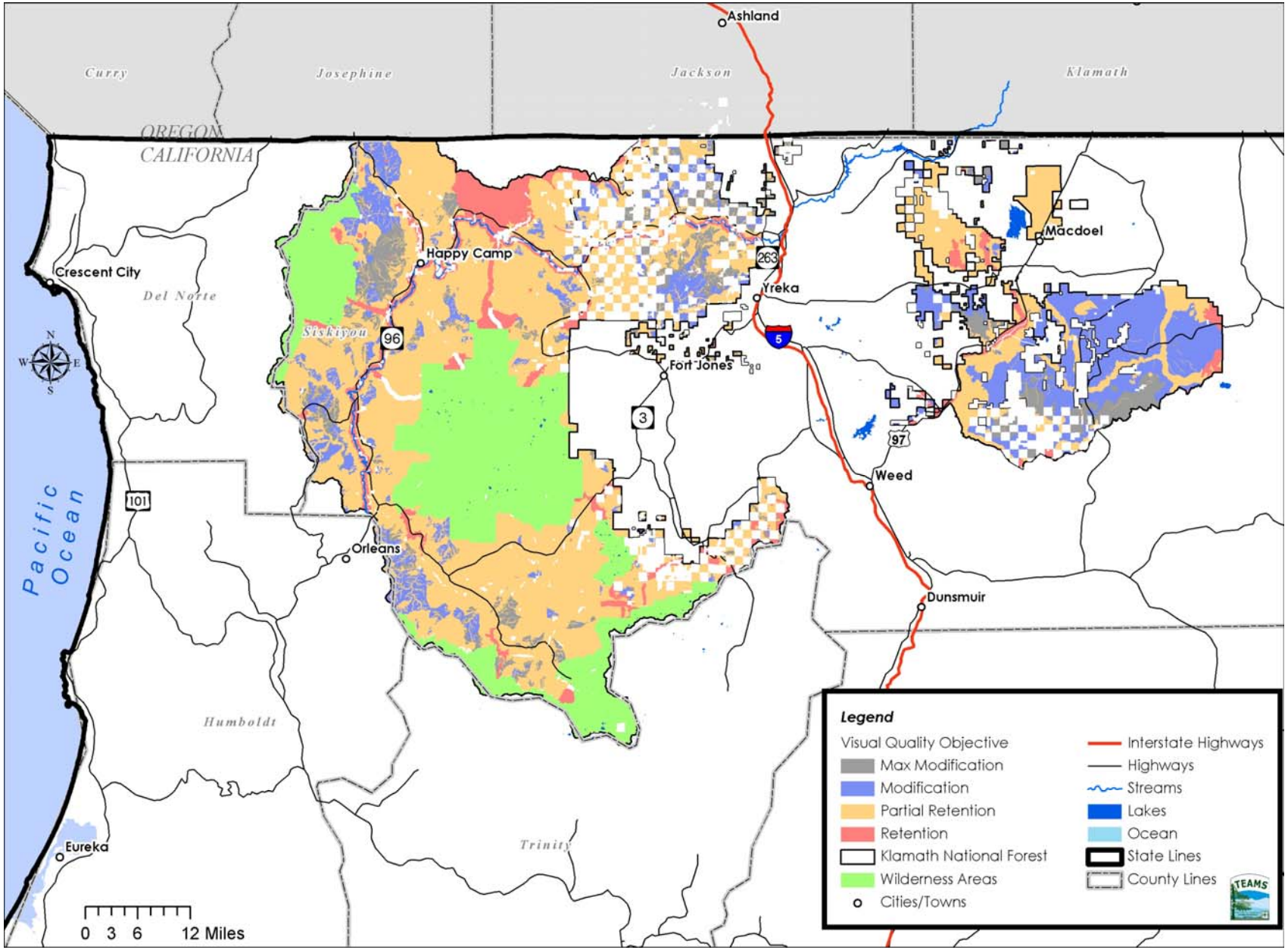

Figure 2. Klamath National Forest Visual Quality Objectives

3.15.3 Effects Analysis Methodology

This analysis was completed using the framework outlined in USDA Forest Service Handbook, The Visual Management System (USDA Forest Service, 1974). Non-characteristic line quality created by trail routes is the greatest impact to the visual resources from the proposed alternatives. Roads and trails can create changes to a naturally appearing landscape by introducing noticeable deviations to the characteristic form, line, color or texture of a landscape. The location and design of these routes can significantly reduce their visual impact.

The proposed alternatives have the potential to affect the visual resource. VQO compliance was based on map review and on-the-ground knowledge of topography and vegetation of the area. Representative route addition samples were also field checked to verify VQO compliance. VQO compliance of proposed unauthorized route additions is documented in the project record. The "Assumptions specific to visual resources analysis" section lists assumptions used to determine VQO compliance. To determine the visual effects of the alternatives overall, ArcMap geographic information system (GIS) was used to analyze the alternatives in regards to key viewshed locations and VQOs assigned to the area. Effects to key viewsheds and compliance with retention and partial retention VQOs are measurement indicators for this analysis.

VQOs provide direction for visual resources to determine the level of acceptable change for the landscape and are established in the Klamath LRMP. This analysis uses VQOs to determine if the alternatives meet Forest Plan standards and guidelines by comparing the degree of alterations from an otherwise natural-appearing forest landscape. The Klamath LRMP and Agriculture Handbook Number 462 provide definitions for the VQOs used for the visual management of lands administered by the Klamath NF:

Preservation VQO – This VQO provides for ecological changes only (USDA Forest Service, 1995). Management activities, except for very low visual impact recreation facilities, are prohibited (USDA Forest Service, 1974).

Retention VQO – Activities are not evident to the casual forest visitor (USDA Forest Service, 1995). This VQO provides for management activities that are not visually evident. Under retention, activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape (USDA Forest Service, 1974).

Partial Retention VQO – Activities may be evident but must remain subordinate to the characteristic landscape (USDA Forest Service, 1995). Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape (USDA Forest Service, 1974).

Modification VQO – Activities may dominate, but must utilize naturally-established form and texture. These areas should appear natural when viewed in foreground or middleground situations (USDA Forest Service, 1995).

Maximum Modification VQO – Activities may dominate, but should appear as a natural occurrence when viewed in background situations (USDA Forest Service, 1995).

General Guidelines for Effects Analysis for Visual Resources:

Assumptions specific to visual resources analysis:

- Based upon the review of Klamath LRMP the basic measurement indicator for the visual resources is compliance with the retention and partial retention VQOs.
- The preservation VQO occurs only in designated wilderness areas, and motorized access is not authorized in designated wilderness areas.
- NFTS additions are generally low impact roads or trails, which easily meet the modification and/or maximum modification VQO. These VQOs allow for activities, such as roads and trails, which dominate the characteristic landscape but utilize naturally-established form and texture.
- The visual resource would benefit from the elimination of dead-end routes.
- The prohibition of cross-country travel would have a beneficial effect on scenery.
- Key Viewsheds for this analysis are the travelways identified in the LRMP: State Highways 3, 96, 97 and Interstate 5. Highway 263, part of the State of Jefferson Scenic Byway, was also identified as a key viewshed for this analysis.
- Changing the road use, season of use, or vehicle class on existing NFTS roads would have no effect on scenery.

Data Sources

- FLRMP for distribution of VQOs and identification of scenic viewsheds
- Forest's National Visitor Use Monitoring (NVUM) report to determine the popularity of viewing scenery or driving for pleasure.
- Recreation Facility Analysis for deriving recreation program niche
- Forest Service Handbook 462 – The Visual Management System

3.15.4 Visual Resources Indicators:

Measurement Indicator 1: The extent to which the proposed NFTS falls within the retention and partial retention VQOs (number of miles traversing landscapes that are to remain natural to near-natural appearing in character).

Measurement Indicator 2: Number of key viewsheds that are or have the potential to be affected by motorized vehicle travel. Retention and partial retention VQOs are generally assigned to key viewsheds. For each alternative determine if proposed NFTS is in compliance with VQOs assigned to the key viewsheds.

3.15.5 Visual Resources Methodology by Action:

1. Direct/indirect effects of the prohibition of cross-country motorized vehicle travel.

2. Direct/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, the approximate length of time for natural rehabilitation of unauthorized routes.

Spatial boundary: The "viewshed" is the unit of spatial analysis when considering effects associated with changes in the NFTS or season of use. Viewsheds encompass lands generally seen from a travel route or use point such as a campground. The following travel routes and their associated viewsheds have been identified as key viewsheds for this analysis: State Highways 3, 263, 6, 97 and Interstate 5.

Indicator(s): The extent to which the proposed NFTS falls within the retention and partial retention VQOs (number of miles traversing landscapes that are to remain natural to near-natural appearing in character).

Methodology: VQO compliance was based on map review and on-the-ground knowledge of topography and vegetation of the area. Representative samples were also field checked to verify VQO compliance. GIS analysis of added routes in relation to retention and partial retention VQOs was also completed.

Rationale: Compliance with the retention and partial retention visual quality objectives (VQOs).

3. Changes to the existing NFTS [this can include changing the vehicle class and season of use].

No change in effects for visual resources as it is assumed that existing system roads, with road template, are already in place. Changing the road use, season of use, or vehicle class would have no effect on scenery.

4. 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, the approximate length of time for natural rehabilitation of unauthorized routes.

Spatial boundary: The "viewshed" is the unit of spatial analysis for determining cumulative effects. Viewsheds encompass lands generally seen from a travel route or use point such as a campground.

Indicator(s): Number of key viewsheds that are or have the potential to be affected by motor vehicle travel.

Methodology: Identify key forest viewsheds (scenic byway corridors, etc). The following travel routes and their associated viewsheds have been identified as key viewsheds for this analysis: State Highways 3, 263, 6, 97 and Interstate 5. 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 visual quality objectives (VQOs). Retention and partial retention VQOs are generally assigned to key forest viewsheds.

3.15.6 Affected Environment/Environmental Consequences

Affected Environment

Americans highly value scenery, or visual quality, within their national forest. Natural appearing forests offer scenes, which are valued as recreational settings and living environments. Such settings contribute to the well-being of many individuals in today's complex and fast-paced society. Conservation of the naturally established scenic character of these settings is the primary goal of visual management on all national forests.

The Klamath National Forest's 1.7 million acre expanse of winding river canyons, rugged lake-speckled wilderness areas, and distinctive volcanic landscapes provide a setting for a variety of recreational activities. Remoteness from large population centers provides opportunities for uncrowded recreational experiences. The Forest's recreation program niche, "room to renew," emphasizes this value.

The Forest scenery is known for its diversity, ruggedness, and primitive character. An abundance of scenic river canyons, mountain crests, and pristine, undisturbed landscapes offer high-quality settings for a growing number of recreation pursuits. Such pursuits include sightseeing from motor vehicles, river rafts, or hiking.

About 60 percent of the Forest's land is visible from areas where users have a high concern for scenic values. Most of these have been assigned retention and partial retention VQOs but may have other VQOs

also assigned. Of the Forest's landscapes, 22 percent are classified as highly attractive. These landscapes occur in mountain ranges above 5,000 feet elevation, river canyons, large wet meadows, or many other of the Forest's prominent geologic features. The majority of the Forest consists of mostly pleasing, yet common landscapes located on moderately steep slopes and ridges or on fairly level terrain.

The Forest has a high portion of lands with steep to moderately steep slopes and soil colors that can sharply contrast with its green forests and other more subtle vegetative patterns. Thus its overall capability to retain a natural appearance when altered is relatively low. Although roads and trails cause visual contrasts noticeable on the landscape, as described above, they often provide the platform for viewing scenery and other natural features. The top four activities by Forest visitors based on 2001 national visitor use monitoring data were: viewing natural features, relaxing, viewing wildlife, and driving for pleasure. Viewing natural features was the most popular activity on the Forest with about 61 percent of Forest visitors participating. Driving for pleasure was the fourth most popular activity with about 27 percent of Forest visitors reporting participation in this activity (USDA Forest Service, 2001). Extensive off-highway vehicle use occurs forestwide on the existing road system. Other popular concentrated use areas for off-highway vehicle use are the Humbug area on the Oak Knoll Ranger District and the Goosenest Ranger District.

Visual impacts from off-highway vehicle use include unimproved roads and trails, which often create linear alterations on the landscape and have the potential to be viewed by Forest visitors looking from other locations or by Forest visitors traveling on the route itself. Roads and trails, when viewed from another location, have the potential to create negative visual impacts by introducing non-characteristic linear features on a non-linear landscape with color contrasts from exposed soils on the routes and high use areas. Due to topographic and vegetative screening, seen during field review, these deviations are not noticeable in key viewsheds from the travel routes identified in this analysis. In most cases, the visual impact is a short duration view of a low impact unimproved road or trail intersecting the road or highway. These low impact intersections are generally not evident to the casual Forest visitor, or, if they are evident, they remain subordinate to the characteristic landscape. The deviations from the characteristic landscape caused by off-highway vehicle use are most noticeable to the person riding on the road or trail. No unauthorized inventoried routes are identified as key viewsheds and would meet the allocated VQO when viewed from the unauthorized route itself.

Forest landscapes have been altered by both human activities and by natural processes. Impacts from human activities are primarily the result of past logging, road building, and, to a lesser extent, mining activity. The effects of wildfire are also noticeable on the landscape. Wildfires are positive elements that have contributed to the Forest's natural landscape character, patterns, and diversity. At present, 74 percent of the Forest has a natural appearance, while the remainder appears altered. Most of the strong visual contrasts occur either in the background distance zone or out of sight of major highways, trails, or recreation areas.

Key Viewsheds

Five highways traversing the Forest were identified by the State of California as eligible State Scenic Highways; namely Highways 3, 263, 96, 97, and Interstate 5. As designated in the LRMP, the foreground distance zones of these routes are managed with a retention VQO except the Butte Valley National Grassland along Highway 97, which is managed with a partial retention VQO.

The Forest also has all or portions of one national scenic byway and three National Forest Scenic Byways, including: All American Road – Volcanic Legacy Scenic Byway, State of Jefferson, and Bigfoot. The scenic byways traverse the Forest, showcasing a rich diversity of geology, climate, plants, wildlife and rural communities.

Visual Quality Objectives (VQOs)

In 1995 the LRMP established five VQOs for the Forest's 1.7 million acres. See the following table for the acreage distribution of the VQOs. These objectives are used to define the amount of acceptable landscape alteration for a particular project.

Table 111. Forest acres and mileage of inventoried unauthorized routes by visual quality objectives (National Forest System lands only)

Visual Quality Objective	Acres	Percent of total Forest acres	Mileage of inventoried unauthorized motorized routes
Preservation	389,000	23	0.30
Retention	128,000	8	24.91
Partial Retention	802,000	47	171.37
Modification	248,000	15	147.36
Maximum Modification	113,000	7	32.23
Totals	1,680,000	100	376.17

Environmental Consequences

See the effects methodology section above regarding how this analysis was conducted. The following table compares the mileage of proposed unauthorized road and trail route additions in retention and partial retention VQOs by alternative. Mileage of NFTS roads currently closed but proposed as open and mileage of roads with proposed mixed use are not included in this table. All other proposed unauthorized route additions are located in modification and maximum modification VQOs.

Table 112. Miles of unauthorized routes added to the NFTS in retention and partial retention VQO

Indicator - Visual Resources	Miles of Unauthorized Routes Added to the NFTS, by Alternative					
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Unauthorized Route Additions in Retention VQO	N/A[a]	1.46	0	0	7.92	7.92
Unauthorized Route Additions in Partial Retention VQO	N/A[a]	26.04	0	3.60	28.41	27.18
Total Mileage of proposed unauthorized route additions in alternative[b]	N/A[a]	92.00	0	6.89	69.28	59.30

a - Under Alternative 1 no changes or additions to the NFTS would be made, but unauthorized routes would continue to be used and cross-country motorized vehicle travel would continue.
b - Total mileage includes all proposed unauthorized route additions including those routes located in modification and maximum modification VQOs.

Alternative 1 – No Action

Under the no action alternative, the existing condition as described in the affected environment section would continue.

Direct and Indirect Effects of the Prohibition of Cross Country Motorized Vehicle Travel

Under this alternative, cross-country motorized vehicle travel would not be prohibited. Unauthorized routes would continue to be used and would not naturally rehabilitate over time. Attempting to quantify effects associated with potential future cross-country travel is speculative because it is impossible to predict exactly where, when, or how cross-country motorized use would occur. It is anticipated that cross-country motorized travel would continue and increase in areas with gentle terrain such as the Humbug area on the Oak Knoll Ranger District and on the Goosenest Ranger District. Cross-country travel has the potential to impact retention and partial retention VQO areas, which are managed as natural to near-natural appearing in character. In the short-term, due to topographic and vegetative screening, the uncharacteristic linear and color effects typically associated with cross-country motorized travel would not be noticeable in the key viewsheds identified for this analysis. However visual impacts from cross-country motorized use may be noticeable in areas outside of these viewsheds which are assigned retention or partial retention VQO. In the long term, the potential of new motorized cross-country routes developing in key viewsheds would increase. Cross-country motorized travel in areas with sparse vegetation would be more visible to Forest visitors and the uncharacteristic linear features and lighter colored exposed soils would have a negative effect on the visual resource. In most cases, uncharacteristic linear features seen on the landscape would not meet retention or partial retention VQO. In the long-term, the public would notice more impacts to visual resources from cross-country motorized travel and anticipated development of additional unauthorized routes. User-created routes would continue to be used by all motorized vehicles. Cross-country motor vehicle travel would continue, therefore this alternative has the greatest visual impact to the natural-appearing landscape when compared to the other alternatives.

Direct and Indirect Effects of Adding Facilities to the NFTS and Direct and Indirect Effects of Changes in Existing Season and Class of Use

No additions or changes to the existing NFTS would be made under this alternative so there would be no direct or indirect effects to scenery from these actions.

Cumulative Effects

The cumulative effects analysis for scenery considers the impact of the alternatives when combined with past, present, and reasonably foreseeable future actions and events. The "viewshed" is the unit of spatial analysis for determining cumulative effects for the visual resource. Viewsheds encompass lands generally seen from a travel route or use point such as a campground. The following travel routes and their associated viewsheds have been identified as key viewsheds for this analysis: State Highways 3, 263, 6, 97 and Interstate 5. Retention and partial retention VQOs are assigned to these key viewsheds. The temporal scope is 20 years and was selected because it is the approximate length of time for natural rehabilitation of unauthorized routes. In analyzing cumulative effects of Motorized Travel Management, the Klamath National Forest considered effects from all present and reasonably foreseeable future actions that have potential for changing road density within the analysis area. These actions affecting the visual resource include new road construction, reconstruction, decommissioning and/or adding roads to the Forest transportation system. As stated in the Affected Environment section, impacts from human activities are primarily the result of past logging, road building, and, to a lesser extent, mining activity. Most of the Forest has a natural appearance, while the remainder appears altered. Most of the strong visual contrasts occur either in the background distance zone or out of sight of major highways, trails, or recreation areas.

Since cross-country motorized travel would continue under this alternative, the unpredictable proliferation of user-created routes would continue. The present and reasonably foreseeable future activities would continue to form the landscape aesthetics and recreation opportunities. Recreation activities and developments and travel management activities, including the NFTS, most often form the viewing platform and opportunities for viewing scenery. Any new road construction, reconstruction, decommissioning and/or adding roads to the Forest transportation system are expected to meet the VQOs assigned to the management area in which they occur. Abandoning, closing or decommissioning roads generally results in a more naturally appearing landscape. Most of the strong visual contrasts would continue to occur either in the background distance zone, in areas not assigned retention or partial retention VQO, or out of sight of major highways, trails, or recreation areas. Although the majority of the Forest would continue to have a natural appearance, it is anticipated that the no action alternative along with the past, present, and reasonably foreseeable future actions would result in an increase in Forest lands which appear altered.

Alternative 2 – Proposed Action

This alternative is the proposed action including the proposed changes to the NFTS and the prohibition of cross-country travel as described in the NOI published in the Federal Register on October 7, 2008. This alternative adds about 92 miles of unauthorized routes as roads and trails and adds two areas open to cross-country motorized travel. In addition to the proposed unauthorized route additions, this alternative allows 88 miles of mixed use on existing NFTS routes, prohibits 10 miles of mixed use on existing NFTS routes, opens 9.96 miles of NFTS roads currently closed, prohibits cross-country motorized travel, and amends the Forest Plan with the prohibition.

Direct and Indirect Effects of the Prohibition of Cross Country Motorized Vehicle Travel

The prohibition of cross-country motorized vehicles would not be noticeable in the short-term as the natural rehabilitation of unauthorized routes would take longer than one year. The visual impact from unauthorized routes may be noticeable until these areas naturally rehabilitate. Most unauthorized routes and their associated visual impacts are not noticeable in key viewsheds due to topographic and vegetative screening. If unauthorized motorized routes intersect the road or highway, a short duration view of a low impact, unimproved road or trail may be noticeable until the route naturally rehabilitates. In the long term, unauthorized motorized vehicle routes and impact areas would naturally rehabilitate.

The effects of this action on visual resources would result in a more natural-appearing landscape. Overall the landscape would have higher scenic integrity than currently exists with less evidence of human activity over time.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative proposes about 1.46 miles of unauthorized route additions in retention VQO and 26.04 miles in the partial retention VQO. Where proposed route additions intersect the road or highway, views of a low impact, unimproved road or trail may occur for short durations, but these intersections generally would not be noticeable to the casual Forest visitor. The visual effects from these proposed route additions meet the retention and partial retention VQOs. The key viewsheds identified for this analysis would not be affected by the proposed unauthorized route additions under this alternative.

This alternative proposes about 65 acres of off-highway vehicle (OHV) cross-country travel areas in the Humbug area and Juniper Flat area. The Humbug OHV area is located in maximum modification VQO. The Juniper Flat OHV area is located in retention VQO due to its proximity to Highway 97. These OHV areas would allow cross-country motorized travel resulting in uncharacteristic linear and color effects which would be especially noticeable from within the area itself. However, the OHV areas would not be visible in the identified key viewsheds because of topographic and vegetative screening. Since the trails and concentrated OHV use in these areas would not be noticeable in the key viewsheds identified for this analysis, the VQOs assigned to these proposed areas would be met.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This action would cause no change in effects for visual resources as it is assumed that existing NFTS roads, with road template, are already in place. Changing the road use, season of use, or vehicle class allowed to access the route would have no effect on scenery.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted.

The present and reasonably foreseeable future activities would continue to form the landscape aesthetics and recreation opportunities. Recreation activities and developments and travel management activities, including the NFTS, most often form the viewing platform and opportunities for viewing scenery. Any new road construction, reconstruction, decommissioning and/or adding roads to the Forest transportation system are expected to meet the VQOs assigned to the management area in which they occur. Abandoning, closing or decommissioning roads generally results in a more naturally appearing landscape. Most of the strong visual contrasts would continue to occur either in the background distance zone, in areas not assigned retention or partial retention VQO, or out of sight of major highways, trails, or recreation areas. The majority of the Forest would continue to have a natural appearance, and areas visually impacted by unauthorized motorized routes would continue to rehabilitate resulting in a more natural-appearing landscape. It is anticipated that this alternative along with the past, present, and reasonably foreseeable future actions would result in no cumulative effects to visual resources. With cross-country motorized travel prohibited, the unpredictable proliferation and concentration of user created routes would end. The landscapes viewed in the key viewsheds identified for this analysis would have more natural-appearing characteristics. Overall the landscape would have higher scenic integrity than currently exists with less evidence of human activity over time.

Alternative 3 – Cross-country Motorized Travel Prohibition Only – No Changes to the Current NFTS

Alternative 3 prohibits cross-country motorized travel and proposes no additions to the existing system of roads and trails.

Direct and Indirect Effects of the Prohibition of Cross Country Motorized Vehicle Travel

The prohibition of cross-country motorized vehicles would not be noticeable in the short-term as the natural rehabilitation of unauthorized routes would take longer than one year. The visual impact from unauthorized routes may be noticeable until these areas naturally rehabilitate. Most unauthorized routes and their associated visual impacts are not noticeable in key viewsheds due to topographic and vegetative screening. If unauthorized motorized routes intersect the road or highway, a short duration view of a low impact, unimproved road or trail may be noticeable until the route naturally rehabilitates. In the long term,

unauthorized motorized vehicle routes and impact areas would naturally rehabilitate. This alternative, when compared to the other alternatives, would have the least impact to visual resources as all unauthorized motorized routes would naturally rehabilitate over time, resulting in a more natural-appearing landscape.

Direct and Indirect Effects of Adding Facilities to the NFTS and Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative proposes no new additions or changes to the existing National Forest Transportation System of roads and trails. In the long term the landscape viewed from existing system roads and trails would be more natural-appearing.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. The cumulative effects of alternative 3 would be the same as the cumulative effects described for alternative 2. See the cumulative effects section under alternative 2.

Alternative 4 – Maximize Quiet Recreation Opportunities

Alternative 4 prohibits cross-country motorized travel and adds fewer routes to the NFTS than the proposed action in response to the concerns of cost, maintenance, wilderness, quiet recreation use, and natural resource impacts. This alternative adds about 6.89 miles of unauthorized routes as roads or trails and adds no areas open to cross-country travel. In addition to the proposed unauthorized route additions, this alternative allows 119.25 miles of mixed use on existing NFTS routes, prohibits 7.66 miles of mixed use on existing NFTS routes, and prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

Direct and Indirect Effects of the Prohibition of Cross Country Motorized Vehicle Travel

The effects on visual resources from the prohibition of cross-country motorized vehicles under this alternative would be the same as those described for alternative 2. See the direct and indirect effects of the prohibition of cross country motorized vehicle travel section under alternative 2. The effects of this action on visual resources would result in a more natural-appearing landscape.

Direct and Indirect Effects of Adding Facilities to the NFTS

The addition of unauthorized roads, trails, and areas under this alternative would have similar effects as those described under alternative 2 but to a lesser degree. See the direct and indirect effects of adding facilities to the NFTS section under alternative 2.

This alternative proposes 0 miles of unauthorized route additions in the retention VQO and 3.60 miles in the partial retention VQO. The visual effects from these proposed unauthorized route additions meet the partial retention VQO. The key viewsheds identified for this analysis would not be affected by the proposed unauthorized route additions under this alternative.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

The effects on visual resources from this action would be the same as those described for alternative 2. See the direct and indirect effects of changes to the existing season and class of use section under alternative 2.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. The cumulative effects of alternative 4 would be the same as the cumulative effects described for alternative 2. See the cumulative effects section under alternative 2.

Alternative 5 – Maximize Motorized Recreation Opportunities

This alternative is based on the refined proposed action (alternative 6) and proposes additional routes and mixed use to provide more access and motorized recreation opportunity than the proposed action. This alternative adds about 69.02 miles of unauthorized routes as roads or trails and adds two areas open to cross-country travel. In addition to the proposed unauthorized route additions, this alternative allows 277.77 miles of mixed use on existing NFTS routes, prohibits 7.66 miles of mixed use on existing NFTS routes, opens 4.66 miles of NFTS roads currently closed, and prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

Direct and Indirect Effects of the Prohibition of Cross Country Motorized Vehicle Travel

The effects on visual resources from the prohibition of cross-country motorized vehicles under this alternative would be the same as those described for alternative 2. See the direct and indirect effects of the prohibition of cross-country motorized vehicle travel section under alternative 2. The effects of this action on visual resources would result in a more natural-appearing landscape.

Direct and Indirect Effects of Adding Facilities to the NFTS

The addition of unauthorized roads, trails, and areas under this alternative would have similar effects as those described under alternative 2 but to a slightly greater degree. See the direct and indirect effects of adding facilities to the NFTS section under alternative 2.

This alternative proposes about 7.92 miles of unauthorized route additions in the retention VQO and 28.41 miles in the partial retention VQO. The visual effects from these proposed route additions meet the

retention and partial retention VQOs. The key viewsheds identified for this analysis would not be affected by the proposed unauthorized route additions under this alternative.

This alternative proposes about 53 acres of OHV cross-country travel areas in the Humbug area and Juniper Flat area. The Humbug area is located in maximum modification VQO. The Juniper Flat area is located in retention VQO due to its proximity to Highway 97. These OHV areas would allow cross-country motorized travel resulting in uncharacteristic linear and color effects which would be especially noticeable from within the area itself. However, the OHV areas would not be visible in the identified key viewsheds because of topographic and vegetative screening. Since the trails and concentrated OHV use in these areas would not be noticeable in the key viewsheds identified for this analysis, the VQOs assigned to these proposed areas would be met.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

The effects on visual resources from this action would be the same as those described for alternative 2. See the direct and indirect effects of changes to the existing season and class of use section under alternative 2.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. The cumulative effects of alternative 5 would be the same as the cumulative effects described for alternative 2. See the cumulative effects section under alternative 2.

Alternative 6 – Refined Proposed Action

This alternative is based on corrections to the proposed action. Further field reconnaissance and a few administrative errors led to refinement of the proposed action. This alternative adds about 59.3 miles of unauthorized routes as roads or trails and adds two areas open to cross-country travel. In addition to the proposed unauthorized route additions, this alternative allows 105.21 miles of mixed use on existing NFTS routes, prohibits 7.66 miles of mixed use on existing NFTS routes, opens 4.66 miles of NFTS roads currently closed, and prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

Direct and Indirect Effects of the Prohibition of Cross Country Motorized Vehicle Travel

The effects on visual resources from the prohibition of cross-country motorized vehicles under this alternative would be the same as those described for alternative 2. See the direct and indirect effects of the prohibition of cross-country motorized vehicle travel section under alternative 2. The effects of this action on visual resources would result in a more natural-appearing landscape.

Direct and Indirect Effects of Adding Facilities to the NFTS

The addition of unauthorized roads, trails, and areas under this alternative would have similar effects as those described under alternative 2 but to a slightly greater degree. See the direct and indirect effects of adding facilities to the NFTS section under alternative 2.

This alternative proposes about 7.92 miles of unauthorized route additions in the retention VQO and 27.18 miles in the partial retention VQO. The visual effects from these proposed route additions meet the retention and partial retention VQOs. The key viewsheds identified for this analysis would not be affected by the proposed unauthorized route additions under this alternative.

This alternative proposes about 53 acres of OHV cross-country travel areas in the Humbug area and Juniper Flat area. The Humbug area is located in maximum modification VQO. The Juniper Flat area is located in retention VQO due to its proximity to Highway 97. These OHV areas would allow cross-country motorized travel resulting in uncharacteristic linear and color effects which would be especially noticeable from within the area itself. However, the OHV areas would not be visible in the identified key viewsheds because of topographic and vegetative screening. Since the trails and concentrated OHV use in these areas would not be noticeable in the key viewsheds identified for this analysis, the VQOs assigned to these proposed areas would be met.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

The effects on visual resources from this action would be the same as those described for alternative 2. See the direct and indirect effects of changes to the existing season and class of use section under alternative 2.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. The cumulative effects of Alternative 6 would be the same as the cumulative effects described for alternative 2. See the cumulative effects section under alternative 2.

Summary of Effects Analysis across All Alternatives

This section summarizes the effects analysis by discussing how well each alternative addresses the visual resource measurement indicators. Alternative 1 is the worst for addressing compliance with the retention and partial retention VQOs and key viewsheds affected by the proposed NFTS in that continued cross-country motorized travel would likely impact retention and partial retention VQOs and the key viewsheds identified for this analysis in the long term. All action alternatives would be beneficial to visual resources by prohibiting cross-country motorized travel. All action alternatives would meet retention and partial retention VQOs. Key viewsheds identified for this analysis would not be affected by the proposed NFTS in any action alternative.

Compliance with the Forest Plan and Other Direction

Alternative 1 allows cross-country motorized travel, which puts visual resources at risk and promotes changes to the landscape in key viewsheds that may not comply with Forest Plan prescribed retention and partial retention VQOs in the long term. All action alternatives would meet the visual resource standards and guidelines outlined in the Forest Plan. All action alternatives have been designed to meet the retention and partial retention VQOs as viewed from the travel routes identified as key viewsheds for this analysis.

3.16 Transportation Management

3.16.1 Introduction

This section of the environmental analysis examines the extent to which alternatives respond to transportation facilities direction established in the Klamath National Forest Land and Resource Management Plan (LRMP). The Forest Plan transportation facilities direction was established under the implementing regulations of the National Forest Management Act (NFMA) and the National Forest Roads and Trails Act (FRTA). The National Forest Transportation System (NFTS) consists of roads, trails, and airfields. The NFTS provides for protection, development, management, and utilization of resources on the national forests. Other roads and trails exist on the Forest that are not currently part of the NFTS. Transportation facilities considered in this analysis include roads and trails that are suitable for motor vehicle use. This chapter considers changes needed to the NFTS to meet the purpose and need of this analysis. Decisions regarding changes in the transportation facilities must consider: 1) providing for adequate public safety, and 2) providing adequate maintenance of the roads and trails that will be designated for public use. The analysis in this section focuses primarily on these two aspects of the NFTS.

3.16.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

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

Title 36, Code of Federal Regulations, Part 212 (36 CFR 212) is the implementing regulation for the 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 and trails. Providing safe transportation facilities and considering the affordability of maintaining the transportation facilities are two of the criteria.

Forest Service Manual Sections 2350 and 7700 contain agency policy for management of the NFTS. The policy requires the development of trail management objectives (TMOs) and road management objectives (RMOs). 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 7709.59 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 including considerations for public safety.

The Klamath National Forest is predominantly located in California with a small portion of the Oak Knoll Ranger District located in Oregon.

The 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. Division 1, Sec. 360 defines a highway as 'A way or place of whatever nature, publicly maintained and open to the use of the public for purposes of vehicular travel. Highway includes street'. The exclusion of roads from the definition of a highway is defined in the CVC as follows:

> **Div 16.5, Sec. 38001**: (a) Except as otherwise provided, this division applies to off-highway motor vehicles, as defined in Section 38006, on lands, other than a highway, that are open and accessible to the public, including any land acquired, developed, operated, or maintained, in whole or in part, with money from the Off-Highway Vehicle Trust Fund, except private lands under the immediate control of the owner or his or her agent where permission is required and has been granted to operate a motor vehicle. For purposes of this division, the term "highway" does not include fire trails, logging roads, service roads regardless of surface composition, or other roughly graded trails and roads upon which vehicular travel by the public is permitted.

Oregon Revised Statutes (ORS) regulates the use of motor vehicles in Oregon, including motor vehicles used on the national forests. Per ORS 821.190, it is unlawful to operate a Class III vehicle on a highway, but exemptions are established in 821.200. One of these exemptions is "(2) a snowmobile or all-terrain vehicle may be lawfully operated upon a highway under any of the following circumstances…(c) Where the highway is posted to permit snowmobiles or all-terrain vehicles. ORS 821.200 states "The prohibitions and penalties under ORS 821.190 do not apply when a snowmobile or all-terrain vehicle that qualifies for the exemption from equipment requirements under ORS 821.010…"

The exemption noted above is described in ORS 821.020:

Applicability of off-road vehicle exemption from general equipment requirements.

(1) This section establishes the areas where the exemption from equipment requirements for off-road vehicles described under ORS 821.010 is applicable. The exemption applies to any land, road or place within the State of Oregon that meets the description in subsection (2) of this section and that is not posted as closed to off-road use.

(2) The exemption applies to each of the following lands, roads and places:

(a) Lands that are open to the public.

(b) Roads, other than two-lane gravel roads, that are open to the public.

(c) Paved parking lots adjacent to or on designated off-road vehicle areas, trails and routes that are open to the public.

(d) Any local two-lane gravel road that is open to the public and that is designated by the road authority with jurisdiction over the road as open to off-road vehicles that are described in ORS 821.010. [1983 c.338 §711; 1999 c.565 §4]

The Forest Service, Pacific Southwest Region has determined that Klamath NF operational maintenance level 3 through 5 roads (see definitions below) do not meet the CVC 38001 highway definition exclusions. The Pacific Southwest Regional Forester's letters, file code 7700/2350, dated 08/21/06, 06/20/07, 3/27/08, 09/08/08, 01/13/09, and 2/13/09 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. This is termed motorized mixed use (MMU) by the Forest Service. The Oregon statutes allow the Forest Service to approve MMU on unpaved roads.

The Klamath National Forest Land and Resource Management Plan (LRMP) includes forest-wide goals for transportation and facilities management. Specific standards pertinent to travel management include:

Transportation Planning

20-1 Transportation planning shall be an integral part of Ecosystem Analysis at the landscape/watershed level and of environmental analysis at the site level. Planning efforts should include a review of the existing Road Management Objectives (RMOs) and proposals for the development of new roads. Develop RMOs through an ID team. Place needed non-system (now called unauthorized) roads in the Forest road system. Non-system roads not needed for future management shall be "put to bed." Direction for transportation planning is found in Forest Service Manual 7710, Transportation Planning Handbook and Forest Service Handbook 7709.55.

Operation and Maintenance

20-4 Road closures may be permanent or seasonal. Road closures can be used to meet wildlife needs, water quality and soils protection objectives, fire protection, other resource needs, to reduce road damage and maintenance costs and to reduce or eliminate conflicts between user groups.

Road Management Terms

The following terms are used throughout this section.

Annual Maintenance: The expected yearly maintenance required on roadways and roadsides on the Maintenance Level assigned to the road. The actual amount of maintenance required depends on the amount of use the road has received, the condition of the surface, the season of use and physical factors such as topography, soil type, vegetation and precipitation.

Deferred Maintenance: This maintenance work can be deferred, without loss of road serviceability, until such time as the work can be economically or efficiently performed. Deferred maintenance needs can be reduced through a number of different actions and strategies (see appendix C).

Road maintenance level (ML): The Forest Service maintains roads in 5 levels. These are summarized and tailored to the Klamath National Forest. Official definitions can be found at http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?7709.59!..

Maintenance Level 5 roads are mostly double lane paved; they require care every year and significant mission and safety related maintenance every 8 – 10 years. These roads only make up 1 percent of the KNF transportation system.

Maintenance Level 4 roads are mostly chipsealed (gravel topcoat with asphalt binder) with some asphalt pavement sections that also require annual care and significant mission and safety related maintenance every 8 – 10 years. These roads make up 2 percent of the KNF transportation system.

Maintenance Level 3 roads make up 18 percent of the KNF transportation system. Most of these roads were aggregate surfaced at one time, but the rock has worn off or pounded into the native material. These roads are graded as necessary for proper drainage or for safety concerns. These roads provide the main access to the forest and to recreation facilities. The objective is to maintain these roads to be passable for a prudent driver in a passenger vehicle.

Maintenance Level 2 roads make up 61 percent of the KNF transportation system. The majority of these roads are maintained as needed to support Forest projects or provide access for fire protection and to fire lookouts. Some of these roads may not see any maintenance for several years. In some cases, roads may become impassable due to rocks, down trees and encroaching brush. The objective is to maintain these roads for high clearance vehicles such as pickups and many SUVs; however some may be passable by a lower clearance vehicle.

Maintenance Level 1 roads are closed to motorized vehicle use. They are generally placed into self-maintaining hydrologic storage and closed with a closure device. No maintenance is typically performed except to check the closure device. These roads make up 18 percent of the KNF transportation system.

3.16.3 Effects Analysis Methodology

Transportation Specific Assumptions

1) Any motor vehicle use authorized by state law is occurring on the NFTS unless there are Forest-specific prohibitions.

2) Motor vehicle use by special use permit or other permitted activities are outside the scope of this proposal (forest products gathering, motorized special use permit event, recreation residences, mining activities, etc.).
3) Motorized trails will be maintained for high-clearance vehicles (4WD etc), ATVs and motorcycles. Low-clearance highway-legal vehicles are not prohibited from using trails.
4) Some level of maintenance is required for every route open to motor vehicle use by the public.
5) State law regulating motor vehicle drivers sets the standard of care for the safety of themselves and other users for the NFTS.

Transportation Sources of Information

Information on individual roads and trails proposed for addition to the NFTS can be found in Appendix A: Route Specific Data; and information on roads proposed for motorized mixed use can be found in appendix C.

Public Safety – 36CFR212.55 requires public safety be considered when designating roads, trails and areas for motor vehicle use. The proposed additions and changes to the NFTS have been evaluated for the effects on public safety. Refer to appendix A and appendix C for specific information on each road or trail.

Affordability – 36CFR212.55 requires consideration of the need for maintenance and administration of the designated NFTS. Costs for the NFTS include costs for needed maintenance work that has not been completed for various reasons (deferred maintenance) and costs of maintenance that should be performed routinely to maintain the facility to its current standard (annual maintenance). There may be additional costs associated with proposed changes to the NFTS (implementation costs). These costs may be for improving unauthorized routes that will be added to the NFTS, costs for proposed safety and resource improvements, costs for changing maintenance levels, and costs for closing routes to use by motor vehicles.

The Klamath Forestwide Roads Analysis (2002) provided an estimate of deferred maintenance costs of $55.5 million. In 2007, the estimate was revised to $48 million. These numbers are based on a small national random road sample of deferred maintenance needs and are not considered statistically valid at the national forest level. An estimate of deferred maintenance needs on the Klamath National Forest (appendix C) indicates that the cost is around $20 million. Some of this cost is associated with high maintenance (paved) roads, but the majority is associated with native surface or gravel roads (ML 2 and 3). While the number appears high, it is being reduced over time through a variety of activities that are part of a Forest road maintenance strategy (appendix C).

The annual maintenance costs for the current road system are estimated at $3 million; estimated maintenance costs for each alternative are included by alternative in the environmental consequences section. Forestwide average costs per mile to maintain each operational maintenance level (ML) were

developed and applied to the road system to calculate the estimated total cost. The average costs per mile are shown in Table 113. The average costs per mile were derived from local unit costs for maintenance items and frequency of maintenance appropriate for each operational maintenance level. The KNF does not have any designated motorized trails.

Table 113. Annual maintenance cost per mile by operational maintenance level

Operational Maintenance Level	Annual Maintenance Cost $/Mile
1	$30/mile
2	$250/mile
3	$700/mile
4	$7,000/mile
5	$25,000/mile

Implementation costs for proposed changes to the NFTS for each road or trail is listed in the Environmental Consequences section by alternative. The Klamath screened unauthorized routes for potential resource, safety and affordability concerns and does not intend to add any unauthorized routes to the NFTS that will require reconstruction to mitigate problems or recurring maintenance thereafter.

3.16.4 Transportation Management Indicators

Measurement Indicator 1: Public Safety

1A. Miles of Roads/Motorized Trails Added to the NFTS

The 4,537 miles of Klamath NFTS roads are very low volume and predominately low speed routes constructed in mountainous, heavily wooded terrain. These roads can present hazards such as steep drop offs or debris in the roadway, but can be used safely by a prudent drivers taking proper precautions. The Klamath visitor map advises motorists of driving hazards and recommends safety and survival gear to take along. Accidents and especially fatalities are rare and when they occur, often involve a single Forest Service vehicle. There are several factors contributing to the low rate of safety related problems:

- The Forest roads are safe if driven responsibly
- The Forest is not located near any major urban centers
- Siskiyou County is 60 percent public land with a total population of 45,000
- The Forest has one of the lowest visitor use numbers in the nation
- There are no large developed recreation sites that concentrate high numbers of vehicles
- Use is widely dispersed for activities such as hunting, fishing or wood cutting

- Visitors are typically accustomed to mountain roads and drive higher clearance vehicles

Klamath National Forest engineers and other employees review NFTS road conditions on a continuing basis. Given the NFTS size, use patterns and debris fall, not every road is driven or drivable. Identified safety hazards, such as bridge deficiencies, evaluated danger trees or major washouts are corrected or the road is closed. Maintenance funds are prioritized to deal with safety concerns first.

The Forest has 437 miles of public-identified routes that are currently being used. These routes were created from past Forest Service projects or have been created by the public to reach dispersed recreation sites or connect between NFTS roads. Since the Forest is currently open to cross-country travel, these unauthorized routes have been legally open to all vehicle classes for decades.

A review and screening of the public identified routes was conducted for potential resource impacts, along with the suitability for addition to the NFTS as a maintenance level 2 road or a motorized trail. This screening process resulted in the unauthorized route additions proposed in the various alternatives. None of the proposed route additions to the NFTS will have a negative impact on public safety. These routes are short, located on flat to mild slopes and do not have culverts, stream crossings, ditches, rolling dips or other features requiring maintenance for safety or resource mitigation. They have been used for decades with the only maintenance being user accomplished handwork to remove debris that blocks access. If added to the NFTS, this management strategy would continue on these routes with the only change on the ground being minimal signing and danger tree abatement. The added routes will be as safe as or safer than the existing NFTS roads because they are located on gentle terrain, are short and unsuitable for high speeds, and tend to have very low traffic volumes.

1B. Miles of Motorized Mixed Use with Safety Concerns

The CVC allows the operation of non-highway-legal vehicles operated by unlicensed drivers on fire trails, logging roads, service roads regardless of surface composition, or other roughly graded trails and roads upon which vehicular travel by the public is permitted. The ORS allows the operation of nonhighway-legal vehicles on dirt or gravel roads if operated by permitted drivers. ML 2 roads are generally roughly graded and are only maintained for high-clearance vehicles. Operation of non-highway-legal vehicles on these roads is currently authorized by the Forest service and is considered to be consistent with California and Oregon State law. Oregon law furthers extends this provision to ML 3 roads, subject to Forest Service approval. During public workshops held throughout Siskiyou County, it became apparent that many OHV users were not aware of the difference between ML 2 and ML 3 roads, and the associated vehicle restrictions. Their frame of reference is focused on the road surface - whether the road is paved or gravel/dirt. OHV users agreed that paved roads were not open to OHVs, but could not always tell whether unpaved roads were ML2 or ML3. (This situation is exacerbated by the difficulty in maintaining signage in many areas of the Forest). It is clear that some OHV use has occurred on ML3 roads, not because it was sanctioned by the Forest Service, but due to public misperception and historical practices on a large remote road system. An important aspect of implementing any alternative and publishing the motor

vehicle use map will be educating the public on when and where use of non-highway legal vehicles is allowed.

On roads considered highways, the CVC allows for nonhighway-legal vehicle operation if approved for "combined use" under Div 16.5, Sec 38026. NFTS roads maintained for passenger cars are considered highways under the CVC by the Forest Service, and operation of nonhighway-legal vehicles on these routes requires a similar approach using what is termed motorized mixed use analysis (MMUA).

Therefore, ML 3 and 4 NFTS roads proposed for motorized mixed use requires that the decision be informed by a MMUA conducted by a qualified engineer. The analysis identifies risks associated with each road proposed for mixed use. The analysis may include mitigation measures that would reduce the risk associated with designating the road for motorized mixed use.

The MMUA for this project followed the Pacific Southwest Region guidance cited in section 1.2 above. This guidance requires that ML 3 or ML 4 roads proposed for MMU first be looked at to see if reclassification to ML 2 is appropriate. It was determined that 147 miles of the 278 miles of passenger car (ML 3) roads that were proposed for mixed use among the alternatives are actually suitable for management as ML 2 routes. The road management objectives for these roads no longer support ML 3 status because 1) Forest traffic has shifted away from high traffic volume associated with commodity extraction, and 2) these roads do not access developed recreation sites or other sites that concentrate use. The results of the MMUA on these roads support reassigning them to ML 2. The analysis for each alternative includes the entire mixed use proposal, but if the recommendations for reassignment are adopted, then the actual miles of ML 3 road supporting mixed use will be significantly less. See Table 118 and appendix C for details.

The remaining 131 miles of ML 3 roads and two ML 4 routes were evaluated in the MMUA for the proposed alternatives and the probability and severity of a crash was determined to be low in all cases. The MMUA recommends the following mitigations to enhance safety on these routes:

1. Install Share-the-Road signs (to inform drivers of highway-legal vehicles that the route is open for use by non-highway-legal vehicles)
2. Ensure acceptable stopping sight distances on curves by regular vegetation removal in these areas
3. Close mixed use roads to nonhighway-legal vehicles and/or other traffic through use of a Temporary Forest Order when commercial traffic (e.g. logging or chip trucks) is scheduled.

There are some NFTS ML 2 roads that pass through private lands and one road that accesses a sensitive site. These routes are proposed for change from all vehicles to use by highway legal vehicles only. This will enhance the protection of these areas. See Table 119 for details.

Measurement Indicator 2: Transportation System Affordability

2A. Annual Maintenance Costs

Maintenance costs are those required to keep the road in passable condition and to meet safety and resource concerns. Every road does not need or receive maintenance every year, nor is every type of maintenance task completed when a road is maintained. There is no expectation, either by Forest managers or the public that every mile of every Forest road will be passable every year. This holds true for unauthorized routes proposed for addition to the NFTS. These routes will be added as ML 2 roads or motorized trails. Maintenance costs on the routes added as ML 3 roads will be minimal due to their self maintaining attributes, lack of resource impacts over a sustained period and history of user participation to remove downed vegetation, rocks, etc as discussed in measurement indicator 1A. The total annual maintenance cost for the roads and motorized trails to be added to the system is estimated at $50/mile. This cost anticipates only monitoring, sign maintenance and minor drainage maintenance on the trails, due to the screening efforts and road attributes discussed in measurement indicator 1A.

2B. Implementation Costs

Adding routes to the system will have direct effects in the form of initial costs. Actions associated with adding unauthorized routes as ML 2 roads or motorized trails includes initial sign installation and gathering/inputting physical route data into the INFRA corporate database. No reconstruction or major maintenance is anticipated for either type of route and no new construction is proposed. Some of the trails will require minor drainage work such as water bars or rolling dips. The only additional cost for ML 3 motorized mixed use roads will be the installation of “Share-the-Road” signs. Brushing for sight distance is already a requirement on ML 3 -5 roads, but not on ML 2s. Accomplishing the signing and data collection work described above is estimated to cost $100/road or motorized trail ($100/trail). Drainage work on motorized trails is estimated at $1,593/mile. Initial motorized mixed use signing on ML 3 roads will cost approximately $50/mile.

3.16.5 Affected Environment/Environmental Consequences

Affected Environment

A majority of Klamath National Forest visitors travel on NFTS roads. Forest roads are also an integral part of the transportation system for Siskiyou County. They provide access for income-producing activities such as grazing, timber harvest, mining and forest product gathering and for Forest program work such as fish and wildlife habitat management, fire protection, research, and insect and disease control. They also provide access to private parcels located within National Forest boundaries.

The existing NFTS on the Klamath National Forest developed over the last century, first as a trail system for miners and trappers. As four-wheeled modes of travel became available, trails were expanded to accommodate larger vehicles and became wagon roads. The first roads through the KNF provided wagon access to Happy Camp along the Klamath River, Forks of the Salmon and Cecilville on the

Salmon River, and the Haight Mountain area on the east side of the KNF. As the need for transportation efficiency grew and motor vehicles came into use, these routes were reconstructed to higher standards. The road system was greatly expanded in the 1950s and 1960s to accommodate timber harvest activities, and to provide access to industrial timber lands located within the Forest boundaries. These logging roads also provided access for recreational activities, opening up the Forest for a variety of pursuits, and making driving for pleasure one of the current most-cited uses of the Forest by recreationists.

Roads in the NFTS are not public roads in the same sense as roads that are under the jurisdiction of State and county road agencies. National Forest System roads are not intended to meet the transportation needs of the public at large. Instead, they are managed only for the use and administration of National Forest System Lands. Although generally open and available for public use, that use is at the discretion of the Secretary of Agriculture. Through authorities delegated by the Secretary, the Forest Service may restrict or control traffic to meet specific management direction (Forest Service Manual 7731).

The current road system within the Klamath National Forest evolved to consist of nearly 10,000 miles of State, County, Forest Service and private roads, including:

- County and other local roads in and adjacent to the KNF – 4,000 miles
- KNF NFTS – 4,537 miles
- State Highways through and leading to the KNF – approximately 300 miles.
- Public-identified non-system roads and trails - approximately 437 miles.

The Forest grooms 48 miles of snowmobile trails on the Goosenest Ranger District; 32 miles of these trails are on NFTS roads. This work is accomplished through use of California Green Sticker funds. The season of use for those roads (for wheeled vehicles) is May 1 – December 25. This season of use adequately separates the two kinds of motorized use.

The majority of the existing roads on the KNF were constructed for timber harvest and log haul. The ML 3 and 4 roads are fairly wide and have reasonable stopping sight distances and intervisible turnouts. Maintenance level 2 roads were constructed to access timber stands and were designed for logging and administrative traffic only. ML2 roads are generally narrower with steeper grades and tighter curves. For the majority of the ML 2 and 3 roads that once had crushed aggregate surfacing, it has worn down to where it is impractical, both physically and financially, to maintain the surface in a smooth condition. The road surfaces are generally hard, stable and erosion resistant; however travel speeds are generally slow, between 10 and 25 miles per hour. Recent estimates of traffic volume on the majority of NFTS roads range anywhere from less than 1 to around 15 vehicles per day. (At the higher rate, 15 vehicles over a 12 hour period generates a statistical average of one vehicle every 1.25 hours). There are no records or knowledge of highway/nonhighway-legal vehicle crashes on KNF roads over the past 15 years. Site-

specific information regarding road conditions, historical uses and safety for proposed mixed use routes is included in the Engineering Analysis of Motorized Mixed Use contained in appendix C.

NFTS roads are managed in one of three ways: closed long term to motor vehicles (ML 1 - closed roads), roads maintained for high-clearance vehicles (ML 2), and roads maintained for low clearance (passenger car) vehicles (ML 3/4/5). NFTS trails are managed for user type.

Table 114. Existing Klamath NFTS roads by operational maintenance level

Operational Maintenance Level	Miles
1 - Basic Custodial Care (Closed)	813.0
2 - High Clearance Vehicles (native surface)	2768.7
3 - Suitable for Passenger Cars (gravel or native surface)	810.7
4 - Moderate Degree of User Comfort (paved or chipsealed)	102.6
5 - High Degree of User Comfort (paved)	41.5
Total Miles	**4536.5**

Maintenance of the NFS roads is performed and funded from one of five sources:

- Annual appropriations – for road operation and maintenance using a national distribution formula based on several factors such as roaded land area, timber and fuels reduction targets and recreation use.
- Special appropriations and grants – competitive funds based on resource benefits, typically at the watershed level.
- Cooperators – Cooperators are private timber companies that have entered into a cost share agreement with the Forest Service to share the construction and maintenance costs of roads used by both parties. The maintenance of co-op roads is performed by both parties and coordinated at the annual co-op maintenance meeting every spring.
- Timber sale purchasers - purchasers perform maintenance on the roads they use to remove the timber from sales.
- Special use permittees, private landowners, and road use permit holders - As part of their permit, they contribute funds and/or perform maintenance on the roads they use commensurate with their level of use.

Table 115 shows the past four years of maintenance accomplished by the Klamath National Forest (less Ukonom District roads managed and maintained by the Six Rivers NF; appropriated funds only).

Table 115. Miles of system roads and miles receiving maintenance, FY 2005 thru 2008

	FY 2005		FY 2006		FY 2007		FY 2008	
Operational Maintenance Level	**Miles Receiving Maintenance**	**Total System Miles**	**Miles Receiving Maintenance**	**Total System Miles**	**Miles Receiving Maintenance**	**Total System Miles**	**Miles Receiving Maintenance**	**Total System Miles**
Level 1	21.90	799.00	12.74	801.70	72.3	717.8	40.97	717.8
Level 2	478.14	2391.00	367.11	2364.00	824.3	2430	686.03	2430
Level 3	681.54	836.00	479.66	861.00	824.1	914.5	677.28	914.5
Level 4	45.95	118.00	40.64	118.00	75.1	84.1	60.2	84.1
Level 5	19.50	41.00	11.40	41.00	41	41.5	33.2	41.5
Total	1,247.03	4,185.0	911.55	4,185.7	1836.8	4187.9	1497.68	4187.9

Cooperators maintain around 100-200 miles of road per year. Maintenance is primarily on ML2 and ML3 roads. Miles of road maintained by timber purchasers have varied widely in recent years due to economic fluctuations in the timber market and resultant effects on the Forest's timber sale program. Generally, purchasers maintain approximately 25-50 miles of road per year.

The LRMP does not prohibit motor vehicle use over much of the Klamath National Forest. Approximately 1.2 million acres of the Forest are open for cross-country travel. Due to slope, topography and dense vegetation, approximately 508,000 acres are actually available for use by safety-minded motor vehicle operators. There are three large areas on the Goosenest District that have been seasonally closed to off-road travel for many years through Forest Orders. Four other smaller areas (one on the Goosenest District, two on the Oak Knoll District, and one on the Scott River District) are closed to off-road travel year-round by Forest Orders to protect sensitive resources. These Orders will be superceded by implementation of the Travel Management Rule. With the rising popularity of off-highway and nonhighway-legal vehicles, the potential for unauthorized route proliferation across the Forest is increasing.

Ongoing and Foreseeable Road-Related Activities Relevant to Cumulative Effects Analysis

The Klamath National Forest has 14 ongoing or foreseeable future projects that have associated road actions which could affect the NFTS.[4] These projects add roads to the NTFS and remove roads through decommissioning or conversion to other uses. A full list of projects with road-related activities that were considered for this analysis is contained in appendix B. The Forest-wide impact of the road actions is shown in Table 116.

[4] "Ongoing" projects are those for which a decision has been made, but the road mileage has not yet been recorded in INFRA.

Table 116. Ongoing and foreseeable actions affecting the NFTS

NFTS Status	Miles	Proposed Action
Unauthorized	8.1	Add to NFTS as ML 1
Unauthorized	11.4	Add to NFTS as ML 2
NFTS System Road	14.2	Decommission
NFTS System Road	1.8	Remove from NFTS - convert to nonmotorized trail
Total Change in NFTS Mileage	**+3.5**	

While the total mileage added to the NFTS through these decisions is positive, it should be noted that the miles of ML 2 roads decreases, with a corresponding decrease in maintenance costs. The 8.1 miles added as ML 1 roads will not be available for public use, and will have minimal maintenance requirements.

Environmental Consequences

Alternative 1 – No Action

Alternative 1 results in no change to the current situation on the Forest. No roads or trails are added to the NFTS, and no motorized mixed use will be authorized on ML 3 or ML 4 roads.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

Under this alternative, cross-country motorized vehicle travel would be allowed over most of the Forest. Several hundred miles of unauthorized routes, of which some have resource concerns, would continue to be used. Additional user-created routes could create safety or resource concerns. Some OHV users view less restrictive motorized access as a benefit.

Direct and Indirect Effects of Adding Facilities to the NFTS

No additions to the existing NFTS would be made under this alternative. There are no effects on either safety or affordability of the NFTS.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No additions to the existing NFTS would be made under this alternative. There are no effects on either safety or affordability of the NFTS.

Cumulative Effects

No additions to the existing NFTS would be made under this alternative.

Assuming that maintenance funding remains constant and use of NFTS roads continues at current level, it is possible that NFTS roads will deteriorate and the backlog of maintenance needs will increase

over time. However, the KNF has developed a series of strategies, including an active stormproofing and decommissioning program that addresses the deferred maintenance backlog (appendix C). The Forest has a good history of securing grant and partnership funds to decommission and stormproof roads, thereby eliminating or reducing deferred and annual maintenance needs. The Forest will continue to apply its strategies to deal with the deferred maintenance backlog under any of the alternatives.

Alternative 2 – Proposed Action

This alternative adds about 14 miles of motorized trails and 78 miles of roads to the NFTS, designates 65 acres (two areas) open to cross-country motorized travel, allows 119 additional miles of motorized mixed-use on NFTS roads, prohibits 9.4 miles of motorized mixed-use on ML 2 NFTS roads, opens 10 miles of ML 1 NFTS roads, prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The prohibition of cross-country travel would protect OHV users from exposure to potential safety hazards on 508,000 acres of open, available lands. The hazards from asbestos and abandoned mines are addressed in the geology section. The potential for new unauthorized routes being created with safety hazards or resource remediation costs would also be reduced.

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

The 92 miles of roads and motorized trails added to the NFTS have been evaluated for safety and affordability. No safety hazards were identified above and beyond what is typically expected on a NFTS ML 2 road or motorized trail. Implementation activities and costs associated with converting unauthorized routes to operational ML 2 roads and allowing mixed use on ML 3 roads are discussed in measurement indicator 2B (also see Table 117). Implementation activities associated with converting unauthorized routes to motorized use trails may include installation of minimal drainage structures such as rolling dips or water bars on approximately 4.4 miles, and some grading. No new construction or heavy reconstruction is anticipated. The cost estimate used was the regional average of $1,593 per mile, for an implementation cost of about $7,000.

Signing for both added roads and trails is estimated to cost $100/road. Total implementation costs are estimated in Table 117.

As covered in measurement indicator 2, adding 78 miles of ML 2 road and 14 miles of motorized trails to the NFTS will minimally add to the Forest's road maintenance costs over time. These routes are already in place, have rough native surfacing, and are self-maintaining. Many of the routes to dispersed recreation sites are short and require very low vehicle speeds. There is no expectation that these new additions will be regularly maintained to a higher standard. Annual maintenance costs are discussed in measurement indicator 2A and summarized in Table 117.

Direct/indirect effects of changes to the existing NFTS

Based on the MMUA, adding motorized mixed use to 88 miles of NFTS roads (ML 3, ML 4 and ML 3 downgrades to ML 2),with the suggested mitigations, will not adversely affect the safety of Forest users and will add minimal cost for signing of ML 3 and ML 4 roads.

Cumulative Effects

The proposed changes to the NFTS have reasonable implementation costs and were selected because they respond to public desire for certain motorized travel routes that would otherwise be eliminated, while not increasing safety risks or adding significant costs to maintain the current NFTS. Present and reasonably foreseeable actions potentially contributing to cumulative effects resulting from this project include road management actions such as road stormproofing, decommissioning and closure, and changes in status. Other ongoing and foreseeable projects would remove 16 miles of ML 2 road from the system; add 8.1 miles of unauthorized routes as ML 1 and 11.4 miles as ML 2 roads. This will result in a decrease in ML 2 road miles and an increase in ML 1 road miles. The annual maintenance costs for ML 2 roads will decrease by $1,150. ML 1 roads are in custodial status and only require closure monitoring for a total of $240.

Alternative 3 – Cross-Country Travel Prohibition Only – No Changes to the Current NFTS

Alternative 3 prohibits cross-country motorized travel and proposes no new additions or changes to the existing NFTS.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The prohibition of cross-country motorized travel would ban motorized vehicles on 437 miles of existing public identified unauthorized routes, and reduce exposure to unmitigated hazards on routes not proposed in any alternatives. The prohibition would also protect OHV users from exposure to potential hazards on 508,000 acres of open, available lands. The potential for new unauthorized routes being created with safety hazards or resource remediation costs would also be reduced.

Direct and Indirect Effects of Adding Unauthorized Routes to the NFTS

This alternative does not add facilities to the NFTS. There are no impacts on cost or safety under this alternative.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not make changes to the existing NFTS. There are no effects on cost or safety under this alternative.

Cumulative effects

This alternative does not make changes to the existing NFTS. There are no direct, indirect or cumulative effects.

Alternative 4 – Maximize Quiet Recreation Opportunities

Alternative 4 prohibits cross-country motorized travel and adds fewer routes to the NFTS in response to the concerns of cost and maintenance. This alternative adds about 0.73 miles of motorized trails and 6.8 miles of roads to the NFTS, does not designate any areas open to cross-country travel, allows 119 miles of motorized mixed use, prohibits 8 miles of motorized mixed use, prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The prohibition of cross-country motorized travel would ban motorized vehicles from 431 miles of existing public identified routes which would not be part of the NFTS. The prohibition would reduce exposure to unmitigated hazards on routes not proposed in any alternatives and also protect OHV users from exposure to hazards on 508,000 acres of open, available lands.

Direct and Indirect Effects of Adding Facilities to the NFTS

The 7.5 miles of roads and motorized trails added to the NFTS have been evaluated for safety and affordability. No safety hazards were identified above and beyond what is typically expected on a NFTS ML 2 road or motorized trail. Implementation activities and costs associated with converting unauthorized routes to operational ML 2 roads and allowing mixed use on ML 3 roads are discussed in measurement indicator 2B (also see Table 117). No implementation activities associated with converting unauthorized routes to motorized trails are anticipated

Signing for both roads and trails is estimated to cost $100/road. Total implementation costs are estimated in Table 117.

As covered in measurement indicator 2, adding 6.8 miles of ML 2 road and 0.73 miles of motorized trails to the NFTS will minimally add to the Forest's road maintenance costs over time. These routes are already in place, have rough native surfacing, and are self-maintaining. Many of the routes to dispersed recreation sites are short and require very low vehicle speeds. There is no expectation that these new additions will be regularly maintained to a higher standard. Annual maintenance costs are discussed in measurement indicator 2A and summarized in Table 117.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Based on the MMUA, adding motorized mixed use to 119 miles of NFTS roads (ML 3, ML 4 and ML 3 downgrades to ML 2), with the suggested mitigations, will not adversely affect the safety of Forest users and will add minimal cost for signing of ML 3 and ML 4 roads.

Cumulative Effects

The proposed changes to the NFTS have reasonable implementation costs and were selected because they minimally respond to public desire for certain motorized travel routes that would otherwise be eliminated, while not increasing safety risks or adding significant costs to maintain the current NFTS. Present and reasonably foreseeable actions potentially contributing to cumulative effects resulting from this project include road management actions such as road stormproofing, decommissioning and closure, and changes in status. Other ongoing and foreseeable projects would remove 16 miles of ML 2 road from the system; add 8.1 miles of unauthorized routes as ML 1 and 11.4 miles as ML 2 roads. This will result in a decrease in ML 2 road miles and an increase in ML 1 road miles. The annual maintenance costs for ML 2 roads will decrease by $1,150. ML 1 roads are in custodial status and only require closure monitoring for a total of $240.

Alternative 5 – Maximize Motorized Recreation Opportunities

This alternative is based on corrections to the proposed action (alternative 6) and proposes additional routes and mixed use to provide for more access and motorized recreation opportunity. This alternative adds about 21.8 miles of motorized trails and 47.3 miles of roads to the NFTS, designates 53 acres (2 areas) open to cross-country travel, allows 278 miles of motorized mixed use, prohibits 8 miles of motorized mixed use, opens 4.66 miles of NFTS roads, prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The prohibition of cross-country travel would ban motorized vehicles on 368 miles of existing public identified unauthorized routes which would not be part of the NFTS. The prohibition would reduce exposure to unmitigated hazards on routes not proposed in any alternatives and also protect OHV users from exposure to hazards on 508,000 acres of open, available lands.

Direct and Indirect Effects of Adding Facilities to the NFTS

The 69 miles of roads and motorized trails added to the NFTS have been evaluated for safety and affordability. No safety hazards were identified above and beyond what is typically expected on a NFTS ML 2 road or motorized trail. Implementation activities and costs associated with converting unauthorized routes to operational ML 2 roads and allowing mixed use on ML 3 roads are discussed in measurement indicator 2B (also see Table 117). Implementation activities associated with converting unauthorized

routes to motorized use trails may include installation of minimal drainage structures such as rolling dips or water bars on approximately 4.9 miles, and some grading. No new construction or heavy reconstruction is anticipated. The cost estimate used was the regional average of $1,593 per mile, for an implementation cost of about $7,800.

Signing for both roads and trails is estimated to cost $100/sign. Total implementation costs are estimated in Table 117.

As covered in measurement indicator 2, adding 47.3 miles of ML 2 road and 21.8 miles of motorized trails to the NFTS will minimally add to the Forest's road maintenance costs over time. These routes are already in place, have rough native surfacing, and are self-maintaining. Many of the routes to dispersed recreation sites are short and require very low vehicle speeds. There is no expectation that these new additions will be regularly maintained to a high standard. Annual maintenance costs are discussed in measurement indicator 2A and summarized in Table 117.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Based on the MMUA, adding motorized mixed use to 278 miles of NFTS roads (ML 3, ML 4 and ML 3 downgrades to ML 2),with the suggested mitigations, will not adversely affect the safety of Forest users and will add minimal cost for signing of ML 3 and ML 4 roads.

Cumulative Effects

The proposed changes to the NFTS have reasonable implementation costs and were selected because they more fully respond to public desire for certain motorized travel routes that would otherwise be eliminated, while not increasing safety risks or adding significant costs to maintain the current NFTS. Present and reasonably foreseeable actions potentially contributing to cumulative effects resulting from this project include road management actions such as road stormproofing, decommissioning and closure, and changes in status. Other ongoing and foreseeable projects would remove 16 miles of ML 2 road from the system; add 8.1 miles of unauthorized routes as ML 1 and 11.4 miles as ML 2 roads. This will result in a decrease in ML 2 road miles and an increase in ML 1 road miles. The annual maintenance costs for ML 2 roads will decrease by $1,150. ML 1 roads are in custodial status and only require closure monitoring for a total of $240.

Alternative 6 – Refined Proposed Action

This alternative is based on corrections to the proposed action based on field reconnaissance and further analysis of the existing data. This alternative adds about 18.4 miles of motorized trails and 40.9 miles of roads to the NFTS, designates 53 acres (2 areas) open to cross-country travel, allows 105 miles of motorized mixed use, prohibits 8 miles of motorized mixed use, opens 4.66 miles of NFTS roads, prohibits cross-country motorized travel and amends the Forest Plan with the prohibition.

Direct and Indirect Effects of the Prohibition on Cross-country Travel

The prohibition of cross-country travel would ban motorized vehicles on 378 miles of existing public identified unauthorized routes which would not be part of the NFTS. The prohibition would reduce exposure to unmitigated hazards on routes not proposed in any alternatives and also protect OHV users from exposure to hazards on 508,000 acres of open, available lands.

Direct and Indirect Effects of Adding Facilities to the NFTS

The 59.3 miles of roads and motorized trails added to the NFTS have been evaluated for safety and affordability. No safety hazards were identified above and beyond what is typically expected on a NFTS ML 2 road or motorized trail. Implementation activities and costs associated with converting unauthorized routes to operational ML 2 roads and allowing mixed use on ML 3 roads are discussed in measurement indicator 2B (also see Table 117). Implementation activities associated with converting unauthorized routes to motorized use trails may include installation of minimal drainage structures such as rolling dips or water bars on approximately 4.9 miles, and some grading. No new construction or heavy reconstruction is anticipated. The cost estimate used was the regional average of $1,593 per mile, for an implementation cost of about $7,800.

Signing for both roads and trails is estimated to cost $100/sign. Total implementation costs are estimated in Table 117.

As covered in measurement indicator 2, adding 40.9 miles of ML 2 road and 18.4 miles of motorized trails to the NFTS will minimally add to the Forest's road maintenance costs over time. These routes are already in place, have rough native surfacing, and are self-maintaining. Many of the routes to dispersed recreation sites are short and require very low vehicle speeds. There is no expectation that these new additions will be regularly maintained to a high standard. Annual maintenance costs are discussed in measurement indicator 2A and summarized in Table 117.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Based on the MMUA, adding motorized mixed use to 105 miles of NFTS roads (ML 3 and ML 3 downgrades to ML 2) ,with the suggested mitigations, will not adversely affect the safety of Forest users and will add minimal cost for signing of ML 3 and ML 4 roads.

Cumulative Effects

The proposed changes to the NFTS have reasonable implementation costs and were selected because they respond (after further review of alternative 2) to public desire for certain motorized travel routes that would otherwise be eliminated, while not increasing safety risks or adding significant costs to maintain the current NFTS. Present and reasonably foreseeable actions potentially contributing to cumulative effects resulting from this project include road management actions such as road stormproofing,

decommissioning and closure, and changes in status. Other ongoing and foreseeable projects would remove 16 miles of ML 2 road from the system; add 8.1 miles of unauthorized routes as ML 1 and 11.4 miles as ML 2 roads. This will result in a decrease in ML 2 road miles and an increase in ML 1 road miles. The annual maintenance costs for ML 2 roads will decrease by $1,150. ML 1 roads are in custodial status and only require closure monitoring for a total of $240.

Summary of Effects Analysis across All Alternatives

The following tables summarize the effects analysis by ranking each alternative regarding how it responds to each measurement indicator.

Table 117 displays the NFTS and estimated costs for each alternative.

Table 117. Estimated additional costs by alternative

Item/Cost Center	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
NFS Roads (miles added)	0	78	0	7	47	41
NFS MotorizedTrails (miles)	0	14	0	0.73	22	18
2a: Annual Maintenance ($)						
Roads[a]	$0	$3,900	$0	$350	$2,350	$2,050
Trails	$0	$700	$0	$50	$1,100	$900
Total Annual Maintenance Cost	$0	$4,600	$0	$400	$3,450	$2,950
2b: Implementation Costs:						
Convert Unauthorized Route to High-clearance Road	$0	$34,200	$0	$2,700	$23,500	$18,300
Convert Unauthorized Route to Motorized Trail	$0	$2,200	$0	$0	$3,300	$3,000
Motorized Trail Drainage Work	$0	$7,000	$0	0	$7,800	$7,800
Total Implementation Cost	$0	$43,400	$0	$2,700	$34,600	$29,100

a - Includes reasonably foreseeable future road actions.

Table 118. Proposed MMU by alternative

District	Road	Existing Op. ML	Proposed Op ML	Miles				
				ALT 1/3	ALT 2	ALT 4	ALT 5	ALT 6
51	12	ML 3	ML 3	0	17.75	17.75	22.69	17.75
51	20	ML 3	ML 2	0	13.09	13.09	13.09	13.09
51	40S01	ML 3	ML 2	0	9.35	9.35	0	9.54
51	40S15	ML 3	ML 2	0	7.23	7.23	7.23	7.23
51	40S16	ML 3	ML 2	0	6.4	6.4	6.4	6.4
51	45N28	ML 3	ML 2	0	1.51	1.51	12	1.51

District	Road	Existing Op. ML	Proposed Op ML	Miles				
				ALT 1/3	ALT 2	ALT 4	ALT 5	ALT 6
51	46N42	ML 3	ML 3	0	1.34	1.34	1.34	1.34
51	46N50	ML 3	ML 3	0	6.35	6.35	9.8	6.35
51	47N69	ML 3	ML 2	0	0	0	4.17	0
52	15N13	ML 3	ML 2	0	3.09	3.09	0	0
52	15N19	ML 3	ML 3	0	0	0	5.12	0
52	17N11	ML 3	ML 2	0	6.81	6.81	7.6	6.81
52	17N16	ML 3	ML 2	0	6.62	6.62	16.56	7.43
52	45N19	ML 3	ML 3	0	2.45	2.45	0	0
52	45N85	ML 3	ML 2	0	4.44	4.44	4.44	4.44
54	39	ML 3	ML 3	0	0	0	32.07	0
54	10N04	ML 3	ML 2	0	0	0	18.69	0
54	38N27	ML 3	ML 2	0	0	0	9.86	0
54	39N23	ML 3	ML 3	0	0	0	13.29	0
54	39N41	ML 3	ML 3	0	0.32	0.32	0.32	0.32
54	39N60	ML 3	ML 3	0	0	0	2.33	0
55	40N08	ML 3	ML 3	0	0	0	13.21	0
55	41N08	ML 4	ML 4	0	2.84	2.84	0	0
55	46N64	ML 3	ML 2	0	6.66	6.66	0	0
57	6	ML 3	ML 2	0	0	0	2.66	0
57	43N02	ML 3	ML 2	0	1.9	1.9	1.9	1.9
57	43N03	ML 3	ML 2	0	0.17	0.17	2.24	0.17
57	43N37	ML 3	ML 2	0	0.71	0.71	0.71	0.71
57	43N69	ML 3	ML 2	0	2.68	2.68	0	2.68
57	44N03	ML 3	ML 2	0	8.82	8.82	8.82	8.82
57	44N23	ML 3	ML 2	0	4.93	4.93	4.93	4.93
57	44N25	ML 3	ML 2	0	0.71	0.71	0.71	0.71
57	46N03	ML 3	ML 3	0	0	0	1.13	0
57	46N09	ML 3	ML 2	0	0	0	2.12	0
57	47N05	ML 3	ML 2	0	2.34	2.34	2.34	2.34
57	47N13	ML 3	ML 2	0	0.74	0.74	8.46	0.74
58	13N11	ML 3	ML 3	0	0	0	11.77	0
58	14N01	ML 4	ML 4	0	0	0	10.08	0
58	15N17	ML 3	ML 3	0	0	0	19.69	0
Total Miles ML 3 & ML 4 Proposed For MMU in Alternative Descriptions				0	119.25	119.25	277.77	105.21
Total Miles ML 3 Proposed For ML 2[a]				0	88.2	88.2	134.93	79.45
Total Miles ML 3 & ML 4 Proposed For MMU after Conversion of ML 3 Roads to ML 2[b]				0	31.05	31.05	142.84	25.76

a - Miles of ML3 roads considered suitable for management as ML2 roads per MMUA.
b - Actual miles of ML3 roads proposed for mixed use if ML3 roads are converted to ML2 per the MMUA.

Table 119. Proposed MMU prohibition by alternative

District	Road	ML 2 Road Miles Proposed For Highway Legal Vehicles Only				
		ALT 1 & 3	ALT 2	ALT 4	ALT 5	ALT 6
51	45N03X	0	0.5	0.5	0.5	0.5
51	45N29	0	1.41	0	0	0
51	45N39	0	0.99	0.99	0.99	0.99
51	46N16	0	2.25	2.25	2.25	2.25
55	40N21	0	2.22	2.22	2.22	2.22
55	45N28	0	0.28	0.28	0.28	0.28
55	46N16A	0	1.2	1.2	1.2	1.2
57	43N30	0	0.54	0.54	0.54	0.54
Total Miles:		0	9.39	7.98	7.98	7.98

Compliance with the Forest Plan and Other Direction

All the action alternatives comply with the LRMP and the Transportation Rule. Additionally, roads analyzed for motorized mixed use were assessed for compliance with the California Vehicle Code, Oregon Revised Statutes and the Forest Service EM-7700-30 “Guidelines for Engineering Analysis of Motorized Mixed Use on National Forest System Roads”. All ML 3 roads proposed for motorized mixed use must have the analysis approved by the Regional Engineer, Pacific Southwest Region. Additionally, ML 3 routes exceeding 3 miles must be approved by the Regional Forester. See appendix C for the motorized mixed use analysis submitted for regional approval).

Transportation Rule (36 CFR 212, 251, 261 and 295): The alternatives in this EIS are designed specifically to implement the requirements of the November 5, 2005, rule for travel management; Designated Routes and Areas for Motor Vehicle Use. In particular, it addresses the requirements of 36 CFR § 212 Designation of roads, motorized trails, and motorized areas which states in part “Motor vehicle use on National Forest System roads, on National Forest System trails, and in areas on National Forest System lands shall be designated by vehicle class and, if appropriate, by time of year by the responsible official on administrative units or Ranger Districts of the National Forest System.”

3.17 Social and Economic Resources

3.17.1 Introduction

The Klamath National Forest (KNF) is located in northern California and southern Oregon. Metropolitan areas within close proximity to the Forest include the cities of Yreka in California and Ashland, Medford and Klamath Falls in Oregon. The KNF serves as a primary recreation spot for many outdoor enthusiasts. In addition to recreation by locals, Forest amenities also attract visitors from outside the study area. A complex system of public roads, highways and interstates provides access to many KNF sites. Access to locations on the KNF influences participation rates in recreational activities.

Activities supported by the Forest affect economic and social conditions for local residents. For example, many local residents identify forest recreation and natural amenities with their quality of life. Therefore management of the KNF affects lifestyles, attitudes, beliefs and values. In addition to the social implications of forest management, visitors to the Forest have consequences for local economic conditions. Ultimately, expenditures related to use of the Forest can impact the type and number of jobs and level of income in the local economy.

The KNF receives many visitors from throughout the Western United States; however the vast majority of visits are from residents of Siskiyou and Jackson Counties. Most of the KNF is located in Siskiyou County, which is extremely rural in nature in relation to most of California. Easily accessible by residents of the study area, the KNF serves as a venue for a variety of recreational opportunities. The Forest offers recreational activities for campers, hikers, wildlife watchers, hunters, fishermen, mountain bikers, white water enthusiasts, naturalists and other outdoor enthusiasts (www.fs.fed.us/r5/klamath/).

Both motorized and non-motorized activities are popular on the KNF. Motorized use on the Forest provides visitors with a means to getting to other locations for non-motorized activities, and serves as a recreational activity by itself. Both motorized and non-motorized activities attract visitors to the Forest, and those visitors have implications for economic and social conditions.

3.17.2 Affected Environment/Environmental Consequences

Affected Environment

Study Area

The KNF study area is defined as four northern California Counties and three southern Oregon Counties: Del Norte, Humboldt, Siskiyou, Trinity, Klamath, Jackson and Josephine.

Population and Demographics

Defining the relationship between the KNF Travel Management plan and the economic and social environments is two fold. First, individuals with different demographic and social backgrounds are likely to be affected differently. Secondly, social and economic well being may affect their tastes and preference of, and demand for, recreational opportunities on the Forest. An important component of this analysis is to inform decision makers of the social and economic conditions evident in the study area. Social and economic conditions may affect the rate and types of activities residents participate in, which in turn affect individual livelihoods. Recreational, subsistence and cultural activities taking place on the KNF serve a primary function in defining the social and economic dynamic of the seven counties. Forest visitors generate important economic stimulus for many businesses, which then impacts employment and income levels.

This section highlights demographic trends in the study area. Current population levels influence the use of natural resources; and forecasts of future population levels may help to indicate whether there may be the potential for increased pressures on Forest resources. Age distributions provide insights into the proportion of individuals in the working age group versus retirees and minors; groups who typically have different use patterns and utilize local services in different ways. Similarly, the racial composition of the population may affect cultural and heritage uses. Employment and income statistics describe the economic conditions of the study area, as well as aid in the identification of important sectors of the economy. Additionally household income could affect participation levels in forest recreation; the greater the income of residents in the seven counties, the greater their ability to participate in various recreational activities.

Population is an important consideration in managing forest resources. In particular, population structure (size, composition, density, etc.) and population dynamics (how the structure changes over time) are “essential to describing the effects and consequences of forest management and planning on a social environment” (Seesholtz, et al., 2004). Population increases may lead to conflicts over forest uses, travel management, recreation activities and values. These are conflicts that Forest Service managers may have to contend with and attempt to balance when making travel management decisions.

Table 120 and Table 121 report the aggregate population and rate of growth from the previous year for all counties and the states. In recent years populations have remained relatively stable; most counties have experienced minimal population growth. Jackson County has experienced the most growth in recent years. Once dominated by the timber industry, recent changes reflect a more service oriented economic base (www.co.jackson.or.us). There have been no sharp increases or decreases in population to suggest substantial changes in the economic and/or social structure.

Table 120. Population and growth rates by county and State, California 2001-2008

	Del Norte		Humboldt		Siskiyou		Trinity		California	
	Pop	% Change	Pop	% Change	Pop	% Change	Pop	% Change	Pop	% Change
2001	27,573	0.3%	127,123	0.5%	44,490	0.5%	12,986	-0.3%	34,430,970	2.1%
2002	27,911	1.2%	128,055	0.7%	44,597	0.2%	13,097	0.9%	35,063,959	1.8%
2003	28,200	1.0%	129,335	1.0%	44,835	0.5%	13,319	1.7%	35,652,700	1.7%
2004	28,665	1.6%	130,452	0.9%	45,141	0.7%	13,506	1.4%	36,199,342	1.5%
2005	28,938	1.0%	131,191	0.6%	45,459	0.7%	13,773	2.0%	36,675,346	1.3%
2006	29,014	0.3%	131,575	0.3%	45,615	0.3%	13,966	1.4%	37,114,598	1.2%
2007	29,301	1.0%	131,977	0.3%	45,667	0.1%	13,970	0.0%	37,559,440	1.2%
2008	29,401	0.3%	132,821	0.6%	45,971	0.7%	13,966	0.0%	38,049,462	1.3%

Source: www.dof.ca.gov

Table 121. Population and growth rates by county and State, Oregon 2001[a]-2008

	Jackson		Josephine		Klamath		Oregon	
	Pop	% Change	Pop	% Change	Pop	% Change	Pop	% Change
2001	183,800	1.4%	76,428	0.9%	64,225	0.7%	3,473,441	1.5%
2002	187,600	2.1%	77,650	1.6%	64,550	0.5%	3,504,700	0.9%
2003	189,100	0.8%	78,350	0.9%	64,600	0.1%	3,541,500	1.1%
2004	191,200	1.1%	78,600	0.3%	64,800	0.3%	3,582,600	1.2%
2005	194,515	1.7%	79,645	1.3%	65,055	0.4%	3,631,440	1.4%
2006	198,615	2.1%	81,125	1.9%	65,455	0.6%	3,690,505	1.6%
2007	202,310	1.9%	82,390	1.6%	65,815	0.5%	3,745,455	1.5%
2008	205,305	1.5%	83,290	1.1%	66,180	0.6%	3,791,075	1.2%

Source: http://www.pdx.edu/prc/
a Source for the 2001 Oregon Population is US Census Bureau Population Change by County (http://www.census.gov/popest/archives/2000s/vintage_2002/CO-EST2002-02/CO-EST2002-02-41.html)

The median age in each county is higher than the median age for their respective states (Table 122). This suggests that residents of the study area are older than residents in more metropolitan areas of California and Oregon. This could be due to the lack of adequate higher educational and job opportunities to draw and retain a younger population. Likewise, there may be a greater influence from retirees.

Table 122. Median age of residents by county and State

California	**34.4 years**
Del Norte County	37.4 years
Humboldt County	35.9 years
Siskiyou County	43.0 years
Trinity County	44.6 years
Oregon	37.6 Years
Jackson County	40.8 years
Josephine County	43.6 years
Klamath County	38.2 years

Source: American Community Survey, 2006; American Community Survey 3-Year Estimates, 2005-2007; and US Census, 2000

Table 123 reports the racial distribution for each county in the study area. According to census definitions, Hispanic or Latino may be of any race. As defined by the U.S. Census Bureau, race and Hispanic origin are two different concepts; thus, people of Hispanic origin may identify with any race (http://www.census.gov/population /www/socdemo/compraceho.html). The vast majority of residents around the KNF are Caucasian. The counties have a similar ethnic composition to the State of Oregon; however it is very different than that of California. As a whole, California is much more ethnically diverse than the counties in the study area. California's population is 59.8 percent Caucasian, where the distribution for the counties ranges from 75.8 percent in Del Norte County to 93.3 percent in Josephine County. Nearly 36 percent of California's population is of Hispanic origin; whereas counties in the study area range from 4 percent to 15.6 percent. Of the five counties, Del Norte is the most ethnically diverse with more than 24 percent of the population being something other than Caucasian. In general, the Native American population has a much higher presence around the KNF than in the states as a whole. Native Americans/Pacific Islanders are the second most populous race in many of the counties. At the individual county level, Del Norte, Humboldt and Trinity have the highest proportions of Native Americans: 6.5 percent, 5.7 percent and 4.8 percent respectively.

Table 123. Racial percentages of total population by county and State

	Caucasian	African American	Am. Ind. & Alaska Native	Asian/ Pacific Islander	Other Race	2 of More Races	Hispanic Origin (of any race)
California	59.8	6.2	0.7	12.7	17.3	3.3	35.9
Del Norte	75.8	3.3	6.5	3.2	7	4.2	15.6
Humboldt	82.8	1.2	5.7	1.8	3.6	4.8	7.7
Siskiyou	87.1	1.3	3.9	1.3	2.8	3.6	7.6
Trinity	88.9	0.4	4.8	0.6	0.9	4.4	4
Oregon	86.2	1.7	1.7	3.8	3.5	3.1	10.2
Jackson	92.9	0.7	0.7	1.4	1.3	3	8.3
Josephine	93.3	0.1	1.5	0.9	1.2	3.1	5.2
Klamath	89.2	0.5	3.5	1.1	2	3.8	8.6

Source: American Community Survey, 2006; American Community Survey 3-Year Estimates, 2005-2007; and US Census, 2000

Employment and Income Conditions

Employment and income statistics are important indicators of economic health. In recent years there has not been any extensive positive or negative change in employment; this is similar to the recent trends in population. Jackson County has experienced the greatest job growth. Given the relative remoteness of many communities in the study area, jobs may not be as vulnerable to swings in market structure and labor demands as total employment at the state level. Table 124 reports the percent change in employment levels from the previous year from 2002 thru 2007. During the specified time period, each county

experienced modest changes in employment numbers. Jackson is the only county that experienced positive job growth over the entire time period. In counties with low population levels and number of jobs, a relatively small change in employment could show up as a relatively large impact in percentage terms. Thus, it is important for land managers to assess the impact of future policy decisions on local employment opportunities.

Table 124. Change in employment from previous year, 2002-2006

	2002	2003	2004	2005	2006	2007
California	-1.0%	-0.2%	1.0%	1.9%	1.8%	0.9%
Del Norte	-1.6%	4.2%	3.9%	2.3%	1.2%	1.0%
Humboldt	0.1%	-0.9%	0.3%	-1.0%	1.8%	-1.2%
Siskiyou	-0.8%	-0.1%	-0.5%	-2.1%	2.0%	-0.6%
Trinity	3.4%	-4.0%	-3.6%	-1.4%	-2.5%	0.5%
Oregon	-1.5%	-0.6%	2.0%	3.6%	2.9%	1.6%
Jackson	0.8%	2.5%	3.7%	3.8%	1.4%	1.1%
Josephine	-2.7%	2.5%	4.2%	6.1%	2.9%	-1.3%
Klamath	-2.7%	-2.5%	1.3%	5.4%	2.3%	-0.1%

Source: www.bls.gov

To assess the relative size of sectors in the local economy, data reported by the Minnesota IMPLAN Group (MIG) is utilized. MIG reports annual economic data for all counties in the United States. 2006 IMPLAN data is utilized throughout this report. MIG utilizes national, State and local data sources to report county level employment, and includes full-time, part-time, seasonal and self employment. Because IMPLAN employment data is reported simply as jobs, not full time equivalents (FTEs), one person with multiple jobs will show up more than once in the data. This prohibits the comparison to local population data provided by the US Census Bureau.

IMPLAN employment data is reported by economic sectors, which are a set of local businesses by industry, grouped together according to similarities in the goods and services offered. Assessing employment and income by sector aids in the identification of industries important for economic sustainability. Table 125 lists the proportion of total jobs in the study area. The government and retail trade support the largest percentage of jobs, followed by health and social services, and other services.

Travel management decisions as they pertain to recreation may affect the condition, and relative importance, of tourism based sectors in the local economy. The natural resources sector (including grazing; wood products and processing; mining; and agriculture, forestry, fishing, and hunting) makes up less than six percent of total employment in the area. Thus, natural resource based industries are not a major contributor to employment in the seven counties overall; however, that sector may become of greater importance when assessing the counties individually.

According to the 2006 IMPLAN data, total employment is 289,801 jobs; however, 42.6 percent of those jobs are in Jackson County, and another 22.2 percent are in Humboldt County. Table 125 reports total employment by industry. Proportionally, Josephine, Klamath, Siskiyou, Del Norte and Trinity Counties account for 12.4 percent, 11.5 percent, 6.4 percent, 3.6 percent and 1.3 percent of total employment respectively. Trinity County has a very low level of total employment relative to all other counties in the study area. The government sector is the largest employer in all counties except for Jackson and Josephine. Retail trade, health and social services and construction are the dominant sectors in Jackson County. The largest sectors in terms of employment in Josephine County are retail trade and health and social services. Proportionally, the agriculture, forestry, fishing and hunting sector is an important employer in Siskiyou, Klamath and Del Norte Counties, accounting for 7 percent, 8 percent and 11 percent of total employment respectively. Many of the activities on KNF support jobs in this sector, making it a valuable source of economic stimulus for those counties. Retail trade and accommodation and foods services are also important sectors in terms of employment. Businesses in these sectors likely generate economic stimulus from activities on the KNF due to travelers purchasing goods and services while on their way to visit the Forest. The importance of such activities varies by county. The more diverse economies of the larger counties may not be as reliant on Forest activities for economic stimulus.

Table 125. County employment by 2 digit NAICS code

	Del Norte	Humboldt	Siskiyou	Trinity	Jackson	Josephine	Klamath	Total
Ag, Forestry, Fish & Hunting	1,098	2,059	1,213	147	5,095	1,744	2,565	13,922
Mining	1	10	15	14	179	97	78	395
Utilities	3	293	53	7	95	27	120	599
Construction	384	3,962	1,147	208	13,379	2,946	1,858	23,884
Manufacturing	301	3,868	739	259	7,036	3,377	2,914	18,494
Wholesale Trade	52	1,256	267	6	2,708	1,105	834	6,228
Transportation & Warehousing	204	2,003	665	58	4,090	927	1,043	8,991
Retail trade	1,086	8,763	1,998	380	20,522	5,267	3,893	41,910
Information	102	770	270	32	1,993	396	278	3,842
Finance & insurance	151	2,293	373	65	3,796	1,242	859	8,780
Real estate & rental	295	2,096	675	109	4,641	1,156	820	9,792
Professional- scientific & technical services	198	3,021	672	122	4,987	1,032	1,074	11,106
Management of companies	0	343	76	0	1,765	177	1,121	3,482
Administrative & waste services	104	2,143	525	25	6,535	1,496	1,395	12,223
Educational services	34	658	105	36	1,482	363	240	2,918
Health & social services	1,275	6,953	1,868	425	14,651	4,959	3,520	33,651
Arts- entertainment & recreation	89	1,183	396	104	3,400	609	547	6,329
Accommodation & food services	927	5,101	1,861	351	8,395	2,930	2,628	22,192
Other services	502	4,545	1,297	394	7,439	2,604	2,187	18,969
Government	3,490	13,097	4,214	1,148	11,308	3,582	5,255	42,095
Total	10,297	64,418	18,429	3,889	123,497	36,040	33,231	289,801

Source: MIG, 2006

Another indicator of economic health is the level of unemployment in the study area. All seven counties have consistently maintained an unemployment rate near or greater than the state average in recent years. Table 126 reports the annual unemployment rate for the counties and states from 2000 thru 2007. Jackson and Humboldt Counties have consistently maintained the lowest unemployment rate. Trinity County has had the highest presence of unemployment, consistently experiencing rates above 10 percent since 2002. As jobs are created in a region, labor comes from two primary sources: local unemployment and in-migration of households. With the higher unemployment rates in some of counties, it is likely that any new demands for labor would be supplied from the local labor market; assuming that qualified individuals reside in the area. Thus, any additional jobs created by activities on the KNF would likely not affect household migration patterns, and may serve to reduce unemployment rates.

Table 126. Annual unemployment rates by counties and State, California 2001-2007

	Del Norte	Humboldt	Siskiyou	Trinity	Jackson	Josephine	Klamath	California	Oregon
2000	7.4	5.8	7.5	9.8	5.6	7	7.4	4.9	5.1
2001	8	6	8.1	9.3	6.6	8.4	8.6	5.4	6.4
2002	8.7	6.7	8.9	10.1	7.5	8.8	9	6.7	7.6
2003	8.5	6.9	9.5	10.5	7.7	9	9.8	6.8	8.1
2004	8.1	6.5	9.5	11	7.1	8.3	9.4	6.2	7.3
2005	7.5	6.2	9.1	10.3	6.2	7.3	7.7	5.4	6.2
2006	6.9	5.5	8	9.9	5.7	6.6	6.7	4.9	5.4
2007	7.6	6	8.6	10.4	5.7	7.2	7	5.4	5.2

Source: Bureau of Labor Statistics, 2008

Income available to residents of the seven counties directly impacts their ability to purchase goods and services. A total of 15.386 billion dollars of personal income was earned by residents of the 7 counties in 2005. Income was generated from the following sources and proportions: payments for labor (58 percent); transfer payments (22 percent); and dividends, interest and rent (20 percent). Dividends, interest and rent are forms of investment earnings, which along with transfer payments are considered non-labor forms of income. Transfer payments consist of a variety of non-labor income payments, including: retirement and disability, medical assistance, social security, unemployment benefits, welfare and veterans' benefits. Earnings from dividends, interest and rent are sources of investment income generated through financial investments or other property income. Labor income is further broken down by wage and salary income, and farm and non-farm proprietor's income. Proprietor's income is earnings from self employment, and is reported separately from wages and salary. The majority of income for local residents is generated by wage and salary income (42 percent). However, a considerable amount of income in the study is earned through non-labor sources.

Table 127. Total personal income by source, all counties, 2005

Total Personal Income ($ Millions)	15,383
Income Source (Percent of Total Income)	
Labor	58%
Non-Labor	42%
Dividends, Interest and Rent	20%
Transfer Payments	22%

Source: EPS, 2007

At the county level, per capita income varies greatly. Table 128 and Table 129 report the personal income and source of income as a percent of total for counties in California and Oregon respectively. Per capita personal income ranges from $21,482 in Del Norte County to $30,239 in Jackson County. Labor income remains the primary source of income in the area; however, roughly half of the total income in Trinity and Siskiyou Counties is generated by transfer payments and investments.

Table 128. Personal income by source, California 2005[a]

	Del Norte	Humboldt	Siskiyou	Trinity
Per Capita Personal Income ($'s)	21,482	27,932	26,874	23,377
Total Personal Income ($ Millions)	617	3,585	1,211	325
Income Source (Percent of Total Income)				
Labor	53%	58%	50%	47%
Wage and Salary	41%	43%	35%	27%
Non-farm Proprietors Income	7%	11%	11%	8%
Farm Proprietors Income	1%	1%	1%	0%
Non-Labor	47%	42%	50%	53%
Dividends, Interest and Rent	15%	20%	22%	20%
Transfer Payments	31%	22%	28%	33%

Source: EPS, 2007
a Does not sum to 100 percent because of adjustments made by the Bureau of Economic Analysis

Table 129. Personal income by source, Oregon 2005[a]

	Jackson	Josephine	Klamath
Per Capita Personal Income ($'s)	30,239	25,198	25,997
Total Personal Income ($ Millions)	5,901	2,033	1,711
Income Source (Percent of Total Income)			
Labor	62%	52%	57%
Wage and Salary	45%	37%	45%
Non-farm Proprietors Income	12%	9%	7%
Farm Proprietors Income	0%	0%	0%
Non-Labor	38%	48%	43%
Dividends, Interest and Rent	21%	21%	19%
Transfer Payments	17%	26%	24%

Source: EPS, 2007
a Does not sum to 100 percent because of adjustments made by the Bureau of Economic Analysis

Visitor Use

According to Executive Order 12862 (1993) information about the quality and quantity of recreation on NFS lands is required for national forest planning and implementation of the national recreation agenda. The National Visitor Use Monitoring (NVUM) program serves as the primary means of monitoring recreational activity at the national, regional and forest level. Under NVUM, each forest is surveyed once every 5 years, yielding consistent data regarding visitor use. The objective of collecting this data is to provide reliable estimates of recreational visits to national forests. A detailed explanation of the methods used for estimating annual recreation use on NFS lands is provided in English et al. (2001).

According to round one data, the KNF received 535,577 national forest visits, which is defined as the entry of one person onto the forest to participate in recreation activities for an unspecified period of time (NRIS HD-NVUM 1.2.2.33). During those visits, individuals participated in a variety of recreational activities. Table 130 reports the participation rates by activity, as well as designates the activities as motorized, non-motorized and other. Motorized activities are those that utilize motor vehicles on NFTS roads and trails. Non-motorized activities also utilize NFTS roads and trails, but with non-motorized forms of transportation such as hiking, biking and cross-county skiing. All other activities do not utilize roads and trails while participating in the activity; however, roads or trails on the Forest may be used to travel to and from a specific destination. The “percent as main activity” reports the primary activity participated in during the visit, and also represents the primary motivation for the trip. Some individuals could have chosen more than one main activity, thus the column could sum to more than 100 percent. In many cases, visitors participated in multiple activities, even though just one was the primary motivator for the trip. The “total activity participation” column represents total participation in all activities and exceeds 100 percent since visitors are likely to participate in multiple activities during their time spent on the Forest. Of the activities chosen as the main reason for visiting the Forest, 9.8 percent fall into the motorized category and 26.6 percent in non-motorized. Of the motorized activities, driving for pleasure was the most popular, accounting for 8.1 percent of main activities and 26.6 percent of total activity participation.

When assessing recreational use, it is important to distinguish between local and non-local visitors. As defined in round one of NVUM surveying, non-local visitors are those who reside more than 30 straight line miles from the Forest boundary (Stynes and White, 2005). This distinction allows for spending related to the Forest visit to be differentiated between locals and non-locals. It is possible that local visitors would substitute recreation on the KNF with other activities in the area, and would still make expenditures at local businesses and firms. Table 131 reports the volume and percentage of local and non-local Forest visits. Visitors are broken into market segments: local and non-local visitors may be either day or overnight, and overnight visitors may stay either on or off the Forest. A non-primary market segment is also reported, and includes those visits where the primary recreation destination was somewhere other than the KNF. Non-local visitors account for 25 percent of the total annual visits to the Forest. Expenditures by these visitors represent new money to the local economy.

Table 130. Activity participation on the KNF

Activity	Activity Emphasis for Road & Trail Use	Total Activity Participation (%)[a/b]	Percent as Main Activity (%)[c/d]
Snowmobiling	Motorized	0.6	0.6
Driving for Pleasure	Motorized	26.6	8.1
OHV Use	Motorized	8.5	1.1
Other Motorized Activity	Motorized	0.0	0.0
		Motorized Subtotal	9.8
Hiking/Walking	Non-motorized	20.3	3.3
Bicycling	Non-motorized	0.8	0.3
Other Non-motorized	Non-motorized	6.9	2.2
Cross-country skiing	Non-motorized	18.5	18.3
Backpacking	Non-motorized	3.9	2.2
Horseback Riding	Non-motorized	0.4	0.3
		Non-motorized Subtotal	26.6
Downhill Skiing	Other	1.4	1.0
Fishing	Other	7.1	3.7
Viewing Natural Features	Other	61.4	15.3
Relaxing	Other	38.0	9.7
Motorized Water Activities	Other	0.3	0.0
Hunting	Other	3.1	2.9
Non-motorized Water	Other	2.1	1.2
Developed Camping	Other	4.1	2.1
Primitive Camping	Other	4.0	1.1
Picnicking	Other	8.3	3.9
Viewing Wildlife	Other	43.9	1.0
Resort Use	Other	0.3	0.0
Visiting Historic Sites	Other	1.1	0.0
Nature Study	Other	14.4	0.9
Gathering Forest Products	Other	8.4	6.8
Nature Center Activities	Other	2.0	0.3
No Activity Reported	Other	20.8	21.7
		Other Subtotal	71.6
		Total	108

a Survey respondents could select multiple activities so this column may total to more than 100%.
b This column represents the percent of survey respondents who indicated participation in this activity.
c Survey respondents were asked to select just one activity as their main reason for visiting the forest. However, some respondents selected more than one, so this column may total to more than 100%.
d This column represents the percent of survey respondents who indicated this activity as their main activity.
Source: NRIS HD-NVUM 1.2.2.33

Table 131. Distribution of KNF visits by market segment

	Non-local Segments			Local Segments			Non-Primary	Total
	Day	Overnight on KNF	Overnight off KNF	Day	Overnight on KNF	Overnight off KNF		
Number of KNF Visits	16,067	53,558	64,269	315,990	10,712	21,423	53,558	535,577
Percent of KNF Visits	3	10	12	59	2	4	10	100

Source: NRIS HD-NVUM 1.2.2.33

Money spent by Forest visitors helps support jobs and income in the local economy. Table 132 reports the annual total spending associated with national forest visits by market segment, downhill skiing visits are reported separately. Non-locals staying the night off the Forest spend the most during their trip. Overall, 53 percent of total spending is by non-locals. Visitors make expenditures on a variety of different goods and services supporting recreational activities. Table 133 reports average expenditures per party per trip by category. Non-locals staying off the Forest spend the most among all market segments; due in large part to the additional expense of lodging at non-KNF facilities.

Table 132. Annual total spending associated with KNF visits by market segment

National Forest Visits Excluding Downhill Skiing	Non-local Segments			Local Segments			Total
	Day	Overnight on KNF	Overnight off KNF	Day	Overnight on KNF	Overnight off KNF	
Total Spending ($1,000s)	282	2,709	5,119	6,282	414	778	15,583
National Forest Visits Downhill Skiing Only	**Non-local Segments**			**Local Segments**			**Total**
	Day	Overnight		Day	Overnight		
Total Spending ($1,000s)	6	132		97	26		261

Source: NRIS HD-NVUM 1.2.2.33

Table 133. Average spending of KNF visitor groups by market segment, dollars per group per trip

	Non-local Segments			Local Segments			Non-Primary
	Day	Overnight on KNF	Overnight off KNF	Day	Overnight on KNF	Overnight off KNF	
Lodging	0.00	13.56	41.71	0.00	10.03	12.27	30.81
Restaurant	11.72	14.91	42.08	5.75	9.18	16.68	27.25
Groceries	6.90	26.89	20.70	4.31	34.79	16.53	17.88
Gas and Oil	12.62	29.26	29.29	11.84	24.28	22.41	19.71
Other Transportation	0.43	1.12	5.68	0.21	0.00	0.32	5.94
Activities	3.27	3.04	9.65	1.77	2.46	9.19	1.61
Admissions/fees	4.30	7.52	7.25	3.54	8.50	8.01	3.15
Souvenirs/other	2.05	10.42	15.06	2.29	6.96	7.17	12.14
Total	41.29	106.72	171.42	29.71	96.20	92.58	118.49

Source: NRIS HD-NVUM 1.2.2.33

According to the NVUM data reported above, motorized activities are not a substantial proportion of recreation. However, according to Cordell et al. (2008) participation in OHV activities has experienced an increasing trend in recent years; participants in the U.S. increased from 37.6 million in 1999 to 51.6 million in 2003. More recent estimates of OHV participants show a decrease to 44.4 million in 2005 thru 2007. Nonetheless, OHV use remains a major source of recreation in the U.S. as estimates for 2005 thru 2007 report that 19.2 percent of Americans age 16 and older have participated in OHV recreation at least once within the last year. California is the highest ranked state amongst OHV users with 4.99 million participants or 11.6 percent of the U.S. total (Cordell et al, 2008).

Lifestyles, Attitudes, Beliefs and Values

The KNF study area is comprised of a diverse group of counties in northern California and southern Oregon. Each county has distinct characteristics that contribute to the conditions of the social environment. Population, age, ethnic distribution, and the composition of economic sectors affect the lifestyles, attitudes, beliefs and values of individuals and groups of individuals whose livelihoods depend in part on the management of the Forest. The geographical location of the KNF has implications for the social dynamic of nearby communities. Located in a very remote part of the Western United States, the lifestyles, attitudes, beliefs and values experienced by local residents are likely to be different than those in more metropolitan areas. The study area is largely dominated by natural resource based activities that support a rural lifestyle. A rural lifestyle is one that relies on agricultural opportunities and outdoor recreation supported by natural resources to maintain a sense of self sufficiency and self-worth. Many local residents depend on the environment to support both professional and personal interests; this in turn affects their lifestyle and attitudes towards the area. This notion varies by individual, and affects their use and ties to the KNF.

Many of the social variables discussed throughout this section indirectly provide qualitative measurement of the well being of local residents. In a study conducted by Doak and Kusel (1997) well-being in the Klamath region is measured as a function of socioeconomic status and community capacity. The Klamath region consists of each county in this study area with the addition of Modoc and Shasta Counties. From these counties, 130 aggregations of census block groups were identified. Doak and Kusel (1997) found that of all the aggregations, 19 percent have low levels of well-being, 32 percent have moderate levels, 40 percent have moderately high levels and 9 percent have high levels. “Both socioeconomic status and capacity in the Klamath region tend to decrease as the relative isolation--as measured by several spatial factors such as distance from major highways and cities and density of public land--of aggregation population increases” (Doak and Kusel, 1997). Such relationships were found to vary at the sub-regional level; however, there was a tendency for community capacity to be higher in aggregations with higher total population and population density. Less than 20 percent of the Klamath region is presumed to have low levels of well-being, this suggests that many local residents experience a relatively high quality of life. Issues identified by Doak and Kusel (1997) imply a recent shift in the social and economic dynamic from a resource extractive based society to one of a more diversified economic base. Clashes between residents with differing value systems are likely to continue, however, interests in the route designation plan on the KNF are likely to be more recreation oriented rather than industrial in nature.

Travel and motorized recreation has been a topic of concern among stakeholders for many years. The current NFTS has a high road density, including 2,400 miles of level 2 roads allowing mixed use. Authorized travel on the Forest affects the livelihoods of individuals and groups in many ways. Many residents of the study area associate their attitudes, beliefs and values with outdoor recreational opportunities and natural amenities. The effects of forest management are different for each person due to

disparities in their ties to the Forest. In the 1995 Klamath National Forest Land and Resource Management Plan (1995 Forest Plan) the most important social issue identified was quality of life. It indicates that many people reside in the area because they value the way of life, and changes to their lifestyle are of immense concern (USDA Forest Service, 1995). Four social groups were identified to have concerns for forest management: long-term residents, new rural, destination recreationists and Native Americans. The e plan is likely to have implications for each. Access to the KNF is important to social groups in different ways. New and old residents may utilize KNF resources for professional and personal reasons. For some, their employment status may depend on the removal of forest products; for others, recreational opportunities may affect how they spend their leisure time. For destination recreationists, access to the Forest may affect their ability to participate in recreational activities, and may also affect their demand for such activities. Furthermore, access to the KNF may affect the cultural and traditional activities experienced by Native Americans. These issues impact lifestyles, attitudes, values and beliefs in many ways. The study area has evolved into less of a resource extractive environment in recent years, thus implications for the recreational, visual and aesthetic qualities of the Forest are likely to have a greater impact on overall well-being.

The majority of public interest has come from residents of Siskiyou County. Small communities close or adjacent to the Forest would be affected more than those further away. For example, Medford and Ashland would be less impacted by a change in recreation trends on the KNF than Happy Camp. The dilution of impacts to small communities is a common occurrence among quantitative analyses due to the scale of data and methods available. Such issues are better addressed through an assessment of the social environment. Despite recent shifts resulting in less influence from agricultural enterprises, the vast majority of the study area is very rural in nature. Siskiyou County is largely influenced by a rural way of life. “The Code of the West: the Realities of Rural Living” (Siskiyou County, 2005) sheds light on some of the conventions of living in Siskiyou County. “The right to be rural” is a fundamental theme among County residents. The rugged terrain of the KNF contributes to the isolation of many communities, and further promotes a rural lifestyle. Self-reliance, interdependence between neighbors, and close interaction with the outdoors are important benefits of living in Siskiyou County. This theme directly relates to the use of KNF resources. Many rural residents, through a lifetime of use, have been able to drive anywhere they want on NFS lands. This freedom to drive off-road is considered by some to be a right rather than a privilege subject to management. Although many residents do not actually drive cross-country, they like to know that the opportunity exists. For these individuals, this change could affect their perception of their relationship to the National Forest more than their actual use. The opportunity would to drive cross-country would be lost under every alternative except the no action (alternative 1).

Assessments of the socioeconomic environment reveal many issues important to local residents. Given the location of the Forest, residents of Siskiyou County would be the most affected by this route designation plan. Many of them have close ties to the Forest, and genuine concerns regarding the implications of travel management planning on their personal lifestyles. The terms “custom, culture and tradition” are used locally; they refer to the types of activities and lifestyle that are generated by local

residents, and passed on through generations of use. Many of those activities are affected by access to the Forest. One important issue is the ability to travel cross-county for dispersed camping. Many residents of Siskiyou County greatly value the ability to camp away from the noise and dust associated with more frequently traveled sites. This is particularly important on the Goosenest District, where cross-country travel is facilitated by the terrain. Local residents have utilized dispersed camping opportunities for generations; and for many families, such activities have become a time-honored tradition. Restrictions in access which limit opportunities for dispersed camping could result in local residents becoming disconnected with the Forest over time. Maintaining those opportunities close to home is part of that tradition. Thus, they may not be likely to look for new areas to recreate because that would result in a loss of traditional values. Maintaining the ability to participate in dispersed camping, especially in traditionally-used sites, is of great importance to the customs and culture of many local residents.

Somewhat in contrast to the supporters of dispersed camping, there are also stakeholders concerned with the implications of motorized travel on ecosystems. A healthy environment also affects the lifestyles, attitudes, beliefs and values of local residents. Many non-motorized recreational activities are enhanced by less motorized travel; thus these users-groups could potentially experience greater value with more restrictions in motorized use. There appears to be a tradeoff in the quality of recreation experienced by parties with different interests. As values increase for one user group, it is possible for values to decrease for others. Finding a balance between all interested parties is a difficult task.

A variety of other issues have also emerged during public scoping. Big game retrieval is a concern expressed by a large segment of the hunting population. This is of particular importance to the elderly and those with physical handicaps with limited ability to walk long distances to retrieve downed game. Siskiyou County residents have been accustomed to using motor vehicles for big game retrieval on flatter terrain on most areas of the Forest, although cross-country travel has been seasonally prohibited on three areas on the Goosenest District for the last 20 years. Under every alternative except for the no action, the opportunity to retrieve big game through cross-county travel would be forgone. This would be a substantial deviation from traditional hunting methods and may result in a greater disconnection between local residents and the Forest. Some hunters may choose to no longer hunt on KNF lands because of the idea that under certain circumstances they would be unable to drive to harvested animals.

Other issues that have emerged are unrelated to recreation. Examples of non-recreation stakeholders are those who gather forest products (e.g. firewood, mushrooms, posts & poles) as part of their lifestyle or for income, contractors involved in reforestation or other activities, and mining claimants. Permit holders and contractors have raised concerns regarding the need for cross country motorized travel in order to fully execute their permit or contract. Holders of special forest products permits (firewood, mushrooms, boughs, posts/poles, etc.) have requested authorization to drive cross country to find and harvest products. Grazing permit holders have areas where OHVs are utilized to check improvements or manage livestock. Contractors involved in reforestation or other activities have an interest in using ML 1 roads in order to access their planting sites. Mining claimants may need to develop access to their claims. The prohibition

on cross country travel does not include exemptions for any specific use. However, accommodation for these types of needs can be made through the permit, contract, or Plan of Operations, if appropriate. These decisions will be made at the program or project levels.

It is possible that in some cases local visitors would substitute activities on the KNF with others in area; however it is unlikely given the customs, culture and traditions. Generally, Siskiyou County residents enjoy outdoor recreation; for many it was a motivating factor in the decision to live there. For the most part they're not likely to substitute KNF recreation for other activities. Additionally, the County is economically depressed, so it's doubtful that many residents would have the desire or capacity to go somewhere else to recreate. Since the KNF represents most of the public land in Siskiyou County, it is not reasonable to expect that local residents can easily substitute cross-country motorized recreation on other lands, even if other Forests weren't prohibiting it. Substitution is even less likely for those who have utilized cross-country motorized travel to gather wood or other Forest products as part of their lifestyle. Likewise, hunters are unlikely to abandon their traditional hunting spots just so they can retrieve their big game by vehicle. That said, there may be a certain degree of substitution that would occur under implementation of the Travel Management Rule. However, privately-owned, State or developed National Forest campgrounds do not offer the quiet and seclusion that may be found at dispersed campsites on the KNF, and many of these substitutes require a fee while dispersed camping is free. Although cross-county travel is prohibited under all action alternatives, the KNF has addressed the dispersed camping issue through identification of motorized routes serving identified dispersed camping sites, so that this opportunity will remain available to Forest users.

The relationship between the KNF and the lifestyles, attitudes, beliefs and values of its constituents has many components. Effects vary by communities of interest according to their uses of the Forest. Communities of interest bring together stakeholders with shared interests in the framing and resolution of a problem (Fischer, 2001). For example, the farming and ranching community has a shared concern for the grazing resource. How that resource is managed affects the social wellbeing of individuals in that community. The ability to travel cross-county is important to many grazing permit holders in order to maintain their operations. Agriculture has historically been an important component of northern California's and southern Oregon's social and economic environments. As the social dynamic of the area changes, so does the presence of communities of interest. The farming and ranching community will continue to be a prominent interest group in the political arena, but as communities evolve, they will continue to be joined by other interest groups with varying views of Forest management. Recreational and environmental interest groups are becoming increasingly involved in the Forest management process. Their lifestyles, attitudes, beliefs and values also depend on the use and management of resources. The Native American community will also continue to utilize forest resources for cultural and traditional reasons. Their way of life depends in part on forest management. With such a variety of communities of interest, the Forest influences livelihoods in many ways. Balancing the interests of each group is an issue that must be taken into account during the route designation process. Siskiyou County supports multiple use of natural resources. The strategic plan expresses the desire for County government to support and

encourage diverse recreational activities on public lands, including both low impact (e.g. hiking, fishing and wildlife viewing) and higher impact (e.g. snowmobiling and OHV riding) activities (Siskiyou County, 2008). The County is also proactive in natural resource conservation, promoting forest health and fire prevention on both public and private lands. Input from the County was helpful in developing route designation alternatives.

Siskiyou County residents have a strong sense of tradition and culture. The Siskiyou County Comprehensive Land and Resource Management Plan states that "the people of Siskiyou County are unique products of the complex web of land and resource uses and practices; values and beliefs that nurture their communities, sustain their economies, empower their local government and give form and shape to their spiritual and physical environments" (Siskiyou County, 1996). The KNF plays an important role in the values and beliefs developed upon traditional uses of the land and community stability. "Community stability entails an environment where people and their customs and cultures are left to their own democratic means" (Siskiyou County, 1996). Implementation of the Travel Management Rule could affect such traditions and cultural values by limiting access to land that residents have established a connection with over time. The goal of the County's comprehensive land and resource planning is to ensure community stability is achieved through the empowerment of local customs and culture rather than national consensus (Siskiyou County, 1996). Thus, it is apparent that residents of Siskiyou County would be greatly concerned by any loss in access to public lands as a result of national policy. Under every alternative, the KNF would retain at least 2400 miles of roads that are open to OHV use, and allow mixed use on roads where such use is safe and reasonable. This is consistent with the Siskiyou County Comprehensive Land and Resource Management Plan, which promotes retention of access to federal lands for the benefit of county residents.

Environmental Justice

As stated in Executive Order 12898, all federal action are required to consider the potential of disproportionate effects on minority and low-income populations in the local region. The principals of Environmental Justice require agencies to address the equity and fairness implications associated with federal land management actions.

According to the American Community Survey and US Census data reported in Table 123, it is suggested that the Native American population meets the Environmental Justice criterion as a minority population meaningfully greater than the general population of the states. Therefore decision makers on the KNF should pay careful attention to the potential impacts of management actions on Native Americans.

Table 134 reports the number of individuals below the poverty level and poverty rates for the 7 counties in the study area and their respective states in 2000 and 2005. In 2005, all counties except for Jackson County have poverty rates higher than that of their respective states. Poverty rates in Del Norte, Humboldt, Siskiyou, Jackson, Josephine and Klamath Counties increased from 2000 to 2005. As of 2005,

Del Norte and Klamath Counties have the highest poverty rates in the study area at 22.5 percent and 20.3 percent respectively. Such poverty rates suggest that a substantial proportion of the existing population should be considered as a low income group. Therefore, decisions regarding future management actions on the Forest should carefully assess the affects on low income populations in the study area.

Table 134. Poverty status by State and county, 2000 and 2005

	2005		2000	
	Number	Percent	Number	Percent
California	4,669,056	13.3%	4,304,909	12.7%
Del Norte County	5,547	22.5%	5,129	21.8%
Humboldt County	20,367	16.5%	19,614	15.9%
Siskiyou County	7,771	17.5%	7,235	16.7%
Trinity County	2,139	16.0%	2,138	16.8%
Oregon	497,318	14.1%	361,280	10.6%
Jackson County	25,875	13.6%	23,266	12.8%
Josephine County	12,609	15.9%	11,949	15.8%
Klamath County	13,062	20.3%	9,072	14.3%

Source: US Census Bureau, Small Area Income and Poverty Estimates

Civil Rights

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.

Restrictions on motor vehicle use that are applied consistently to everyone are not discriminatory. However, some groups could be impacted more than others. The public involvement process for this project (detailed in chapter 1) and interdisciplinary discussions identified the following concerns.

Gathering of 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, and thereby limit people's ability to gather

such products and disproportionately impact protected groups. For many years the Goosenest Ranger District has maintained three large road management areas prohibiting cross-county travel during six months of the year. People using those areas during the closure period (e.g. for mushroom picking) will not be affected by implementation of the Travel Management Rule.

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. While permitted activities may be exempted from the prohibition on cross-country motorized travel when provided in the permit (36 CFR 212.51 (8)), analysis of such exemptions is outside the scope of this document. Such activities have been, and will continue to be, subject to separate, site-specific National Environmental Policy Act analysis before permits are issued.

A prohibition on cross-country motorized travel may result in additional travel time for those who gather forest products, as they may be required to walk rather than drive to gathering sites. In addition, removal of large products (posts and poles) may be limited to sites adjacent to roads. Regardless of the product, all gatherers of forest products will be equally affected by the prohibition; no protected groups will be disproportionately affected.

Impacts on People with Disabilities and the Elderly

Throughout scoping, concerns have been raised about the impact of this travel 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. On the Klamath National Forest, comments primarily focused on access to dispersed camping sites and hunting locations, and access for woodcutting. Where possible, these comments were used to develop alternatives. Hunting and woodcutting sites are dispersed throughout the Forest; it is not possible to develop a route system that would fulfill every hunter's need. Woodcutting is a permitted activity and is addressed under special forest products. Dispersed camping opportunity was addressed through identification of currently used dispersed camping sites across the Forest. Many of these sites are used regularly, and some are traditional use sites for families or individuals. Motorized routes to these identified sites were included in several of the action alternatives. The identification of routes to dispersed camping sites provides opportunities for the elderly and mobility-impaired individuals to enjoy camping away from heavily-used roads and trails. It should be noted that the Klamath National Forest Transportation System contains almost 2,400 miles of roads that are open for use by off-highway vehicles. These roads provide access to a diversity of vegetative types and recreational opportunities, and will continue to be available regardless of the alternative selected for implementation.

Implementation of the Travel Management Rule, Subpart B, including the prohibition of cross-country motorized travel, is forest-wide and applies to all forest users equally. Changes to the National Forest Transportation System are largely limited to changes in vehicle class and season of use. Motorized

access on NFS routes is expected to be enhanced by the addition of unauthorized routes and the addition of vehicle classes on routes where such use has been prohibited.

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.

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 designation ((36 CFR 212.51 (8)). The Forest Supervisor can provide such authorization. This will ensure that motor vehicle access to sacred sites or gathering areas may continue, and access will not be affected by this proposal.

American Indian Rights and Interests

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. 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, rancherias, and Indian colonies all make up “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 135 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 et al. 1998).

Table 135. 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 trbes.
National Historic Preservation Act of 1976	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.
American Indian Graves Protection and Repatriation Act of 1990	Requires consultation with tribes about disposition of American Indian remains, funerary objects, and other cultural relics.

American Indians and the Klamath National Forest

There are four federally recognized tribes that regularly use the KNF: Karuk, Quartz Valley Indian Reservation, Klamath Tribes and Pit River.

There are also two unrecognized tribes in the area: Shasta Tribe Inc., and the Shasta Nation.

American Indians living in or around the Klamath National Forest live throughout the study area and have a significant ongoing interest in the management of the Forest.

Importance of National Forest System Lands and Resources to American Indian People

Contemporary American Indian uses of the Forest include cultural and spiritual events, fishing, hunting, food gathering, collection of medicinal plants, and the collection of basketry materials. Numerous sites on the KNF are used for traditional cultural activities (ceremonies, gathering, etc.). Depending on the site, access may be provided by existing roads, trails, or cross-country motorized travel.

Often, important places to local American Indians are those that supply native foods or provide a spiritual connection to the land. Harvesting of native foods is very important to local tribes. National

Forest System Lands provide salmon, acorns, wild plums, berries, bulbs, and many other foods vital to traditional diets. Traditional food sources serve to regulate health conditions of many American Indians (Martinez, 2008). As American Indians have moved away from traditional foods, negative health effects have been encountered; diabetes is one chronic condition affecting many American Indians forced away from traditional foods (Martinez, 2008). Thus, the availability of Federal lands for food harvesting is an important issue to tribes in the areas in and adjacent to the KNF.

American Indians have a spiritual connection to the environment and native landscapes. Maintaining this type of relationship with the lands managed by the KNF is important to local tribes for passing along knowledge to future generations.

Environmental Consequences

Methodology

Principles of economic impact analysis are relied upon to estimate the effects of KNF route designation alternatives on the economic environment of the study area. “Economic impact analyses seek to determine short-term effects that Forest Service programs have on economic conditions in defined impact areas in which the planning area occurs” (FSM 1900). As prescribed by FSM 1900, short-term effects are those that occur during the first 10 years of a longer planning cycle. Economic impact analyses investigate the effects of the alternative development scenarios on employment and income. The relative size of the local communities plays an important role in the assessment of job and income impacts to the economy. Broader, more diverse, economies should be more resilient to changes in jobs and income than smaller, more rural, communities. For example, a loss of ten jobs in a large metropolitan area should have very little impact on the overall health of the economy. However, the same loss in jobs in a small rural community may severely affect local economic conditions. Thus, when assessing the magnitude of impacts to employment and income across alternatives, it is important to keep in mind the relative importance of those economic factors to the specified study area.

Models of the local economy were built using IMPLAN Professional 2.0 software and 2006 data. For the purposes of this report, the local economy is defined the same as the study area. Changes in activity on the KNF may have several different consequences for the condition of the economic environment. Ultimately, a change in the activities allowable by the Forest would change the local economic stimulus. A change in economic stimulus to a region (e.g. increased recreational visits) would likely change the total level of jobs and income in the region. In order to estimate the level of change, IMPLAN is utilized to develop response coefficients which estimate the level of jobs and income generated per thousand visits by activity type. The response coefficients are then input into the Travel Management Economic Contribution Application (TMECA). TMECA is a spreadsheet that the uses these response coefficients along with data collected from the NVUM survey to estimate the local economic contribution of different types of recreational activities based on whether the recreationists stayed only for a day or overnight

(http://fsweb.ftcol.wo.fs.fed.us/imi/economic_center/Travel%20 Management%20 Economics_economics.html).

NVUM reports estimates of current visitor use by activity type based on interviews of forest visitors as they leave the Forest. Thus, the data available represents the conditions under the no action alternative. There is no means of predicting the change in visitor use across management alternatives. Due to these limitations an economic impact analysis cannot be conducted for the various alternatives. Economic contributions calculated in TMECA are reported for the no action alternative. Response coefficients for each activity are also reported, which allows for inferences to be made regarding the economic implications of changes in visitor use under the action alternatives. Any change in visitor use that would occur as a result of implementation of an action alternative would impact the economy according to the response coefficients. Thus, the discussion of the economic consequences of the action alternatives is based on the response coefficients reported in TMECA.

Response coefficients estimate effects in three parts. First, **direct effects** are the response of an industry to demand for the goods or services it produces. The employment and labor income that result from the production of output to meet demand are direct effects. However, direct effects are only a part of the picture. There are many interdependencies between businesses, consumers, and the natural resources on which economic activity depends. IMPLAN modeling allows a more complete examination of these complex linkages. Then, in addition to direct effects, each sector also has indirect and induced effects. **Indirect effects** are produced when a sector must purchase supplies and services from other industries in order to produce output sufficient to meet demand. The employment and labor income generated in other industries as a result are referred to as indirect effects. **Induced effects** represent the employment and labor income stimulated throughout the local economy as a result of the expenditure of new household income generated by direct and indirect employment.

In addition to impacts on the local economy, there would also be changes to the current condition of the social environment under the action alternatives. As reported in the lifestyles, attitudes, beliefs and values section above, individuals are affected differently due to their unique ties to the Forest. Thus, increases in the social welfare of one group may be offset by decreases to another group. Estimation of net social welfare across alternatives is outside the scope of this analysis. Thus, the effects analysis reported below relies on a qualitative assessment of changes in social conditions stemming from the specifications of the action alternatives.

Incomplete and Insufficient Information

Insufficient information exists to accurately estimate changes in recreation use that would occur under implementation of the action alternatives analyzed in this report. Although certain trends in visitor use may be predicted from the guidelines set forth under each alternative, there is no methods and/or data available to estimate actual changes in motorized and non-motorized recreation. The lack of this information prohibits the ability to conduct an economic impact analysis to estimate differences in

economic conditions across alternatives. The current visitor use data represents the condition under the no action alternative and is used to conduct an economic contribution analysis based on existing conditions. Those contributions serve as a baseline for comparison to the effects of action alternatives. Discussion of those effects is based on the response coefficients by activity and visit type and includes a qualitative assessment of potential economic implications. As more data becomes available regarding recreation use in the future, the response coefficients may be used to estimate specific economic impacts at that time.

Response Coefficients by Activity Type

Table 136 reports the estimated employment and labor income response coefficients by activity type for local and non-local recreation. Both day and overnight (OVN) trips are accounted for. Non-primary (NP) trips are also accounted for, and represents visitation where recreation on the KNF was not the primary purpose for the trip. Local visitors are defined as those visitors whose primary residence is within 30 straight line miles of the Forest visited (Stynes and White, 2005). Non-local visitors are all those who are not considered local. The response coefficients indicate the jobs and labor income supported per thousand visits by activity type. Table 136 indicates that non-local visitation generates larger economic impacts than local recreation because differences in expenditure habits (Table 133). Therefore, increasing visitation by non-local forest users will result in the creation of more jobs and income in the study area than the same increase in visitation by local Forest users. The total economic effects vary widely by activity type. Non-local overnight snowmobiling and cross-country skiing visits generate the most jobs and income in the study area. Per every thousand visits, cross-county skiing supports 2.778 direct jobs and 1.122 indirect and induced jobs, as well as $56,444 in direct labor income and $35,200 in indirect and induced labor income. Non-local overnight snowmobiling is a close second, supporting 2.631 direct jobs and 1.036 indirect and induced jobs, as well as $51,943 in direct labor income and $32,284 in indirect and induced labor income per thousand visits. Snowmobiling accounts for a very small percentage of recreation. Cross-county skiing however, accounts for 18.3 percent of main activities on the Forest.

Two of the most common activities on the KNF as described by the percent participation column in Table 130 are viewing natural features and viewing wildlife. Those activities are combined in the all other activities group. Non-local overnight visits for those activities support, on average, 1.415 direct jobs and 0.68 indirect and induced jobs, as well as $39,954 in direct labor income and $19,275 in indirect and induced labor income per thousand visits.

Economic effects vary by the amount of spending and by the type of activity. It is also important to be careful with the use of response coefficients as they reflect an economic structure that is a snapshot in time. The data used for this analysis reflects the economic conditions of the study area as they were in 2006. Therefore the response coefficients are not applicable to visitation numbers that are dramatically different from current recreation levels. If visitation were to change substantially, there would be a structural shift in the economy as spending patterns changed and these response coefficients would no longer reflect the underlying composition of economic sectors.

Table 136. Employment and labor income response coefficients by activity type

		Employment (Jobs per 1,000 Party-Trips)		Labor Income (2006 dollars) ($ per 1,000 Party-Trips)	
		Direct Effects	Indirect & Induced Effects	Direct Effects	Indirect & Induced Effects
Non-motorized Use					
Hiking/ Walking, Bicycling, Horseback Riding, Other Non-motorized	Local Day	0.177	0.079	$4,183	$2,401
	Local OVN	0.760	0.339	$16,396	$10,640
	NonLocal Day	0.350	0.143	$8,100	$4,154
	NonLocal OVN	1.626	0.662	$34,530	$20,280
	NP	0.177	0.079	$4,183	$2,401
Backpacking	Local Day	-	-	$0	$0
	Local OVN	0.640	0.320	$15,315	$10,135
	NonLocal Day	-	-	$0	$0
	NonLocal OVN	0.758	0.338	$17,855	$10,353
	NP	0.640	0.320	$15,315	$10,135
Cross-country Ski	Local Day	0.340	0.144	$7,109	$4,395
	Local OVN	1.667	0.674	$33,871	$21,121
	NonLocal Day	0.487	0.206	$10,193	$6,302
	NonLocal OVN	2.778	1.122	$56,444	$35,200
	NP	0.340	0.144	$7,109	$4,395
Motorized Use					
OHV Use	Local Day	0.371	0.170	$8,933	$5,202
	Local OVN	0.646	0.302	$15,070	$9,467
	NonLocal Day	0.428	0.196	$10,304	$5,977
	NonLocal OVN	1.076	0.503	$25,111	$15,776
	NP	0.371	0.170	$8,933	$5,202
Driving	Local Day	0.194	0.083	$4,539	$2,511
	Local OVN	0.854	0.336	$17,087	$10,454
	NonLocal Day	0.278	0.120	$6,506	$3,599
	NonLocal OVN	1.423	0.559	$28,480	$17,424
	NP	0.194	0.083	$4,539	$2,511
Snowmobile	Local Day	0.528	0.239	$12,930	$7,256
	Local OVN	1.579	0.622	$31,166	$19,370
	NonLocal Day	0.838	0.367	$19,674	$11,002
	NonLocal OVN	2.631	1.036	$51,943	$32,284
	NP	0.528	0.239	$12,930	$7,256
All Other Use					
All Other Activities[a]	Local Day	0.283	0.135	$7,850	$3,825
	Local OVN	0.872	0.460	$26,242	$13,176
	NonLocal Day	0.466	0.207	$11,688	$5,952
	NonLocal OVN	1.415	0.680	$39,954	$19,275
	NP	0.283	0.135	$7,850	$3,825

Source: TMECA, 2008 and IMPLAN, 2006
a - 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.

Alternative 1: No Action

Under the no action alternative, no changes would be made to the current National Forest Transportation System (NFTS) and no cross-county travel prohibition would be put into place. No Travel Management Rule would be implemented and no motor vehicle use map (MVUM) produced. Unauthorized routes

would continue to have no status or authorization as NFTS facilities, and motor vehicle travel by the public would not be limited to designated routes.

Direct and Indirect Effects

Since no Travel Management Rule would be implemented under this alternative, there is no anticipated change in motorized or non-motorized use on the KNF. Therefore it is assumed that current levels of recreation provide an accurate representation of the effects of visitation on the local economy. There are no predictions of changes to current economic conditions. The effects reported below are simply the total economic contribution of current recreation levels on the Forest and do not imply specific direct and indirect effects that would occur as a result of implementation of the alternative. Since there would be no change in activities on the KNF, there would be no direct and indirect effects on the economy.

The only change in recreation on the Forest would be that occurring as a natural progression from changes in population and tastes and preferences for recreational activities. Contributions to employment and labor income are estimated using current use data reported by NVUM. Table 137 reports the employment and labor income effects by activity type. The contributions of local and non-local residents are reported separately because spending by local residents for recreation on the Forest does not represent new money to the economy. If local residents could not recreate on the KNF, they could find other forms of recreation in the study area and maintain local recreational expenditures. Therefore employment and labor income supported by this type of spending are not necessarily dependent on the opportunities provided by the KNF.

Under current recreation use on the KNF, a total of 67 jobs and $1,652,330 in labor income are supported by non-motorized activities. This includes direct, indirect and induced activity resulting from the expenditures of Forest visitors. Non-local visitors cross-county skiing on the Forest support the most jobs and labor income among non-motorized activities with 41 jobs and $1,008,385 in labor income. Total motorized activities support 12 jobs and $299,025 in labor income. Driving for pleasure supports the most economic activity among motorized recreation; 5 jobs and $130,262 in labor income by locals and 3.2 jobs and $77,499 in labor income by non-locals. Even though average expenditures by non-locals are greater than those of local visitors, (Table 133), there are more total visits by locals driving for pleasure which results in a greater economic contribution than that of non-locals. The majority of economic stimulus supported by recreation on the Forest is from “all other” activities. Those activities include: 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 activities, downhill skiing, gathering forest products, viewing wildlife, sightseeing, and no activity reported. Visitor use in these activities combined supports 139 jobs and $4,071,469 in labor income.

Table 137. Employment and labor income contribution by activity type

	Employment (# of jobs)		Labor Income (2008 dollars)	
	Direct	Indirect & Induced	Direct	Indirect & Induced
Non-Motorized Use				
Backpacking - Local	1	0	23,002	15,222
Non-local	1	0	17,524	10,160
Hiking/Walking - Local	1	1	32,730	19,361
Non-local	2	1	48,991	28,379
Horseback Riding - Local	0	0	2,646	1,565
Non-local	0	0	3,960	2,294
Bicycling - Local	0	0	2,842	1,681
Non-local	0	0	4,254	2,464
Cross-country Skiing - Local	10	4	212,105	131,429
Non-local	29	12	621,185	387,200
Other Non-motorized - Local	1	0	21,069	12,463
Non-local	1	1	31,536	18,268
Total Non-motorized	47	20	$1,021,843	$630,487
Subtotal: Non-Motorized	67		$1,652,330	
Motorized Use				
OHV Use - Local	0.7	0.3	17,713.5	10,582
Non-local	0.6	0.3	15,781.2	9,770
Driving for Pleasure - Local	3.5	1.5	83,506	46,756
Non-local	2.3	0.9	48,363	29,137
Snowmobiling - Local	0.5	0.2	12,839	7,404
Non-local	0.5	0.2	10,692	6,479
Other Motorized Activity - Local	0.0	0.0	0	0
Non-local	0.0	0.0	0	0
Total Motorized	8	3	$188,894	$110,130
Subtotal: Motorized	12		$299,025	
All Other Use				
All Other Activities - Local	44	21.96	1,310,721	648,425
Non-local	49	24	1,422,160	690,164
Total Other	93	45	$2,732,880	1,338,589
Subtotal: All Other	139		$4,071,469	
Grand Total	149	69	3,943,618	2,079,206
Grand subtotal	217		6,022,824	

Source: TMECA, 2008 and IMPLAN, 2006

Table 138 reports the percent of total employment and labor income supported by each activity type. Direct jobs supported by all other activities accounts for 42.9 percent of all jobs contributed to the local economy from recreation on the KNF, and indirect and included jobs account for another 20.9 percent. Total motorized activities accounts for 5.4 percent of total jobs (including direct, indirect and induced

jobs) and 4.9 percent of total labor income (including direct, indirect and induced labor income) supported by recreation on the KNF. In terms of total employment and income in the study area, recreation on the Forest accounts for 0.077 percent of total jobs and 0.060 percent of total labor income (Table 139). Non-local motorized use on the Forest supports just 0.002 percent and 0.001 percent of total jobs and labor income in the study area respectively.

Table 138. Percent of total employment and labor income contributed by activity type

	Employment		Labor Income(2008 dollars)	
	(% of full & part-time jobs)		% of Total Income	
	Direct	Indirect & Induced	Direct	Indirect & Induced
Non-Motorized Use				
Backpacking - Local	0.4%	0.2%	0.4%	0.3%
Non-local	0.3%	0.1%	0.3%	0.2%
Hiking/Walking - Local	0.6%	0.3%	0.5%	0.3%
Non-local	1.0%	0.4%	0.8%	0.5%
Horseback Riding - Local	0.1%	0.0%	0.0%	0.0%
Non-local	0.1%	0.0%	0.1%	0.0%
Bicycling - Local	0.1%	0.0%	0.0%	0.0%
Non-local	0.1%	0.0%	0.1%	0.0%
Cross-country Skiing - Local	4.5%	1.9%	3.5%	2.2%
Non-local	13.6%	5.5%	10.3%	6.4%
Other Non-motorized - Local	0.4%	0.2%	0.3%	0.2%
Non-local	0.7%	0.3%	0.5%	0.3%
Total Non-motorized	21.8%	9.0%	17.0%	10.5%
Motorized Use				
OHV Use - Local	0.3%	0.2%	0.3%	0.2%
Non-local	0.3%	0.1%	0.3%	0.2%
Driving for Pleasure - Local	1.6%	0.7%	1.4%	0.8%
Non-local	1.0%	0.4%	0.8%	0.5%
Snowmobiling - Local	0.2%	0.1%	0.2%	0.1%
Non-local	0.2%	0.1%	0.2%	0.1%
Other Motorized Activity - Local	0.0%	0.0%	0.0%	0.0%
Non-local	0.0%	0.0%	0.0%	0.0%
Total Motorized	3.8%	1.6%	3.1%	1.8%
All Other Use				
All Other Activities - Local	20.2%	10.1%	21.8%	10.8%
Non-local	22.7%	10.8%	23.6%	11.5%
Total Other	42.9%	20.9%	45.4%	22.2%
Totals	68.5%	31.5%	65.5%	34.5%
	100.0%		100.0%	

Source: TMECA, 2008 and IMPLAN, 2006

Under the no action alternative there would be no change occurring to the activities taking place on the Forest. Thus, the employment and income figures reported above represent the contribution of current activities to the local economy. There would be no change in employment and income as a result of implementation of this alternative. Because of this, there are no specific direct and indirect effects that would occur. The information reported represents the status quo, and does not imply changes in economic activity resulting from this alternative.

Table 139. Percent of total area employment and total area labor income

		Employment Effects (full and part time jobs)	Labor Income (2008 dollars)
Total Non-Motorized Use	Local	0.007%	0.005%
	Non-Local	0.017%	0.011%
Total Motorized Use	Local	0.002%	0.002%
	Non-Local	0.002%	0.001%
Total All Other Use	Local	0.023%	0.019%
	Non-Local	0.025%	0.021%
	Total Use	0.077%	0.060%
Total for Study Area		289,800	10,438,379,000

Source: TMECA, 2008 and IMPLAN, 2006

Cumulative Effects

Given that there are no measurable direct and indirect effects that would occur under the no action alternative, there would also be no measurable cumulative effects.

Alternative 2: Proposed Action

The proposed action was developed using input on public-identified inventoried unauthorized routes, maintenance level 1 roads, and mixed use on maintenance level 3 roads. It includes the prohibition of cross-country motorized travel, proposed changes to the existing NFTS, and the additions to the NFTS as described in the NOI published October 7, 2008 (Federal Register Volume 73, Number 195).

The proposed action is the proposed changes to the NFTS and the prohibition of cross-country travel as described in the NOI:

- Adds 14 miles (22 unauthorized routes) to the NFTS as motorized trails
- Adds 24 miles (258 unauthorized routes) to the NFTS as roads to access dispersed recreation sites
- Adds 54 miles (84 unauthorized routes) to the NFTS as roads
- Adds 65 acres (2 areas) open to cross-country travel
- Allows 88 miles (portions or all of 24 NFTS roads) of mixed use
- Prohibits 10 miles (portions or all of 8 NFTS roads) of mixed use
- Opens 9.96 miles (2 closed level 1) NFTS roads
- Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition

Direct and Indirect Effects

This alternative would impose restrictions on allowable motorized recreation since vehicles would be limited to authorized routes and areas open for cross-country travel defined by the MVUM. Such restrictions would result in fewer visitor days for motorized recreation and other activities requiring cross-county travel. Motorized recreation accounts for only 9.8 percent of main activities reported by visitors (Table 130). Of those main activities, only 1.1 percent are in the form of OHV opportunity. Thus, it is likely that restrictions in cross-county travel under this alternative would not substantially reduce visits. The additional roads and motorized trails included in the NFTS, as well as 2 areas designated open to cross-country travel, could serve to mitigate some of the loss in OHV recreation. Additionally, the topography does not allow for cross-county travel in much of the western part of the Forest. As reported in Table 139, total employment supported by current motorized recreation levels accounts for 0.004 percent of total jobs in the study area (0.002 percent from local activity and 0.002 percent from non-local activity). The effects may not be evenly distributed across communities in the seven counties. For example, communities and businesses in close proximity to popular motorized recreation spots that would no longer be accessible under this alternative are likely to be more affected than similar communities and businesses in other parts of the study area. Due to limitations in the data, estimating the effects at such a small scale is outside the scope of this analysis. It is important, however, that decision makers are aware that some communities may experience greater changes in jobs and income than others.

Changes in levels of motorized recreation could stimulate a transformation in recreational visits for non-motorized and other activities. This would serve to mitigate any adverse economic impacts resulting from fewer motorized recreation visits. Non-motorized and other recreational activities account for the majority of visits. Less motorized recreation may increase the quality of the experience for these visitors. Currently data does not exist to estimate changes in jobs and income resulting from the substitution effect between motorized and other recreational activities. Economic impacts vary widely across activity types, thus the direct and indirect effects depend heavily on changes in recreation use that would result from implementation of this alternative. As reported in the contribution analysis for the no action alternative, total jobs and income supported by recreation on the Forest is a very small percentage of total economic activity. Therefore any economic impacts that would be realized under this alternative would be negligible.

Although economic effects appear to be minimal, implications for social conditions may be more recognized by local residents. Analysis of the social environment indicates that both motorized and non-motorized forms of recreation are important to user groups in the study area. Advocates of cross-country motorized recreation would be more limited in terms of access; this would adversely impact the value they experience from use of the Forest. The additional roads, trails and designated play areas that would be authorized under this alternative suggest that motorized recreational opportunities would exist despite restrictions in cross-country travel. However, there would likely be a net loss in motorized recreational visits. The total value experienced by stakeholders concerned with motorized recreation would likely

decline as opportunities to participate in such forms of recreation decline. Additionally, user groups concerned with other forms of recreation requiring motorized access may also be adversely affected. For example, dispersed camping is a common activity among local residents. The prohibition of cross-county travel would limit motorized access to only those campsites accessible by authorized routes. This is more relevant on the Goosenest District where terrain is more accommodating to cross-county travel. Going elsewhere for recreation and gathering forest products has many effects on local residents. Increased travel time and fuel consumption, as well as additional expenses such a campground fees, would limit the substitutability of recreation on the KNF for many. Additionally, the quality of the experience at other sites may not be comparable to the quality they have traditionally experienced. Under this alternative, 258 unauthorized routes would be added to the NFTS for access to dispersed recreation sites. This would mitigate some of the adverse effects to local residents participating in dispersed camping; however, knowing that motorized access to certain areas would be prohibited may cause ideological impacts that result in individuals becoming more disconnected from the Forest.

The prohibition of cross-county travel would also improve conditions of natural resources; which could then increase opportunities for non-motorized recreation. Advocates of non-motorized recreation and user groups concerned with resource and environmental degradation are also active in the study area. Such stakeholders would likely experience an increase in total value provided by opportunities on the KNF due to greater restrictions in motorized access. There appears to be a tradeoff between opportunities provided for different user groups. Forest resources are in fixed supply, thus as opportunities for one group increases it is possible that opportunities for other user groups could decrease. Under the proposed action, it is likely that opportunities for non-motorized recreation would increase, while opportunities for motorized recreation decrease. There appears to be a negative relationship between motorized and non-motorized activities, i.e. increases in one lead to decreases in the other. In terms of economic impacts, it is likely that changes in use by one group would mitigate changes in use by the other group. In terms of net social welfare, a decrease in social wellbeing for one group may be offset by an increase for another. However, there may be individual user groups that are adversely affected. Currently there is no means of estimating the net impact to social welfare.

The proposed action was designed to balance the interests of many parties. The conservation of natural resources and opportunities for non-motorized recreation are addressed through prohibitions in cross-country travel and continued un-authorization of routes in sensitive areas. The KNF has maintained an active decommissioning program that will continue beyond the route designation plan. This is likely to generate additional opportunities for resource conservation in the future.

Cumulative Effects

Cumulative effects include the total change in social and economic conditions that would result from the specifications under this alternative in conjunction with the direct and indirect effects of other past, present, and reasonably foreseeable activities being conducted in the study area. For example, any

environmental change as a result of the proposed action would be in addition to other travel management activities occurring simultaneously in the region on both public and private lands. On the margin, other projects affecting cross-county travel and motorized recreation in the study area are likely to have similar effects on the social and economic environment.

Table 140 reports present and reasonably foreseeable actions that could contribute to cumulative effects stemming from route designation. The estimated direct and indirect effects of each project are unknown. Individually, each project would likely have a minimal impact on social and economic conditions; however, cumulatively they may affect motorized access and travel such that Forest visits are substantially altered. This could change employment and income conditions in the study area, as well as influence the lifestyles, attitudes, beliefs and values of residents. The degree to which the socioeconomic environment would be impacted, as well as the distribution of effects, cannot be determined from the information available.

Table 140. Present and reasonably foreseeable projects Conducted by the KNF that could add to cumulative effects

Project Name	Purpose	Effects on Transportation System
2008 Wildfires Roadside Hazard Tree and Fuels Reduction Project EA	Road management, Fuels management and Forest products	Treatment of hazardous trees and fuels along drivable NFS roads
North Fork Roads Project EA	Road management	Storm proofing, decommissioning and adding existing road
Round Valley Fuels Reduction and Vegetation Management EIS	Fuels and Vegetation management; and Wildlife, Fish, and Rare plants	Temporary roads and closing existing unauthorized roads
Checkerboard Road Hazard Tree Removal CE	Road management	Removal of unsafe trees along roads
Jack Hazard Tree Removal Project CE	Road management, Fuels management and Forest products	Removal of unsafe trees along roads
Deep Creek EA	Road and Fuels management; Forest products; Wildlife, Fish, Rare plants	Evaluate road betterment
Loop Roadside Hazard Tree Removal Project CE	Road, Facility, Fuels, and Recreation management, and Forest products	Removal of unsafe trees along roads
Luv's-A-Hazard Roadside Hazard Tree Removal Project CE	Road, Facility, Fuels, and Recreation management, and Forest products	Removal of unsafe trees along roads
Atwood Road and Waterline Renewal Permit CE	Special Use management	Renewal of road permit
Rick Ward Special Use Permit CE	Special Use management	Renewal of road permit
Seasonal POC Gate EA	Watershed management	Install gate across road 15N01

Source: Schedule of Proposed Actions (SOPA) Report, USDA Forest Service Klamath National Forest, 2009

In addition to route designation planning on the KNF, other national forests are undertaking similar efforts. Thus, travel on nearby NFS lands will likely be changing. This may affect the availability of substitute activities. Other forests are in various stages of travel management, thus there is no information available that addresses the aggregate social and economic implications of all plans being developed in the study area.

Lands under other ownership may also undergo changes to transportation systems that would influence cumulative effects. Currently, the Bureau of Land Management (BLM) manages a substantial land base in the study area and supports a variety of motorized recreational opportunities. The Arcata Field Office manages the Samoa Dunes Recreation Area which allows year-round OHV use on 220 acres. Another area open to OHV use is the waveslope at South Spit, however a 15 mph speed limit is imposed and no play activities are allowed (Cann, 2009). There are currently no reported projects planned by the Arcata Field Office that would substantially influence motorized recreation on these lands. The Redding and Alturas Field Offices also manage lands on the California side of the study area. Although some OHV roads and trails exist in close proximity to forest, there are no present or reasonable foreseeable projects that would influence motorized recreation to a large extent (Zaffarano, 2009; Singleton, 2009). Thus, any influence on cumulative effects would be minimal.

The BLM's Medford Field Office is managing projects that could influence motorized recreation in the study area. In December of 2008 the BLM issued a Record of Decision for the Western Oregon Plan Revision; plans under the revision include the designation of seven OHV emphasis areas (Byrd, 2009). Additionally, the Timber Mt. OHV Area Management Plan Draft EIS, released February 2009, identifies existing trails to be designated as part of an OHV trail system and analyzes alternatives providing additional OHV opportunities on adjacent private lands (DOI Bureau of Land Management, 2009). These projects would create additional opportunities for motorized recreation, and serve as substitute activity areas for those on the KNF.

Lands under private ownership offer additional opportunities for motorized recreation. Both authorized and unauthorized travel across private land occurs in the study area. The Timber Mt. OHV Area Management Plan Draft EIS addresses OHV use on private lands adjacent to BLM land. Additionally, there may be other projects prohibiting or improving motorized recreation by large scale lands owners that could impact social and economic conditions. The majority of projects would likely be small scale, and would not dramatically alter recreational habits. Direct and indirect effects from such projects would likely be minimal. Surveying private land owners in the study area is outside the scope of this analysis, thus actual implications for cumulative effects remains unknown.

Alternative 3: Cross-country Travel Prohibition only – No Changes to Current NFTS

This alternative meets the objective of prohibiting cross-country travel but proposes no new additions to the existing system of roads and trails. Issues addressed include: maintenance and cost of NFTS, wilderness, quiet use, and natural resource impacts. Specifications of alternative 3 include:

- Adds no new NFTS facilities
- Prohibits cross-country motorized travel and amends the Forest Plan accordingly

Direct and Indirect Effects

This alternative addresses concerns for impacts to natural resources and "quiet recreation." Quiet recreation is considered non-motorized activities that are often enhanced with improved ecological conditions. As reported in the effects analysis for alternative 2, there appears to be a negative relationship between certain recreational activities. The principles reported under the proposed action that describe the effects to different interest groups apply. In alternative 3 there would be additional opportunities for non-motorized recreation, and value experienced by these user groups would increase. Alternatively, there would be fewer opportunities for motorized recreation and activities such as dispersed camping. This would result in decreased value experienced by these user groups. Many local residents associate their lifestyles with recreational opportunities on the Forest. The substitution of recreational activities would create unevenly distributed effects across interest groups. The degree to which individual lifestyles are affected is unknown; however variations in the values experienced by different user groups would occur.

There continues to be a trade-off in the economic effects associated with changes in recreational habits. Therefore, economic activity lost due to decreased motorized visits may be offset by additional stimulus generated by an increase in visits for non-motorized recreation. However, it should be noted that recreation on the KNF accounts for a small portion of economic activity in the study area. Therefore, effects on the economic environment would be negligible. The social effects, however, are likely to be more relevant. There would be a greater decrease in opportunities and social values for individuals passionate about motorized recreation and activities that require cross-county travel than would occur under the proposed action. Conversely, advocates of non-motorized recreation and conservation of natural resources would benefit more from alternative 3 than they would under the proposed action.

Cumulative Effects

Other projects in the study area that may contribute to cumulative effects are described under the proposed action. Under this alternative there would be a greater displacement of motorized recreators. However, substitute activities would likely occur within the study area. Cumulative effects would be similar to those reported under the proposed action paired with any changes in the levels and distribution of direct and indirect effects on the social environment that would result from this alternative.

Alternative 4: Maximize Quiet Recreation Opportunities

Alternative 4 responds to concerns about maintenance and costs of the NFTS, wilderness, quiet use, and natural resource impacts by prohibiting cross-country travel and adding fewer routes to the NFTS. Specifications of this alternative include:

- Adds 0.73 miles (2 unauthorized) routes to the NFTS as motorized trails
- Adds 1.81 miles (18 unauthorized routes) to the NFTS as roads to access dispersed recreation sites

- Adds 4.97 miles (9 segments) of unauthorized routes to the NFTS as roads
- Adds 0 acres (no areas) open to cross-country travel
- Allows 119.25 miles (portions or all of 25 NFTS roads) of mixed use
- Prohibits 7.66 miles (portions or all of 7 NFTS roads) of mixed use
- Opens 0 miles (no closed level 1) NFTS roads
- Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition

Direct and Indirect Effects

This alternative addresses concerns for quiet recreation and impacts to natural resources to a greater degree than alternative 3. Not only would cross-country travel be prohibited, there would be fewer routes added to the NFTS than under any other alternative. The direct and indirect effects would be similar to those reported for alternative 3; however, there would be fewer opportunities for motorized travel and greater resource conservation and opportunities for quiet recreation. There would continue to be a tradeoff among motorized and non-motorized activities, resulting in a loss of wellbeing to advocates of motorized recreation and a gain in social welfare to conservationists and participants of other activities. The distribution of effects across stakeholders remains unknown; however benefits would be skewed towards opponents of motorized recreation. This alternative offers the fewest routes among the action alternatives which could improve the quality of non-motorized activities and opportunities for the protection of natural resources. This could enrich the lifestyles of user groups with those concerns. Conversely, fewer routes suggest that there would be a decrease in the quality and diversity of motorized recreation; which could deteriorate the social benefits to those user groups.

The direct and indirect effects on the economic environment would remain minimal. Any adverse impacts associated with the reduction in motorized travel on the Forest could be mitigated by increased activity among other user groups. The effects would be greater for the social environment, possibly leading to a greater disconnection between the Forest and locals participating in motorized recreation and other activities requiring cross-county travel. There would be fewer opportunities for dispersed camping, which would result in a greater loss in social welfare to those users. Conversely, this alternative would yield the greatest social benefits to individuals concerned with resource conservation and non-motorized activities.

Cumulative Effects

This alternative would yield the greatest displacement of motorized recreators than any other. However, substitute activities would likely continue to occur within the study area. The only change to the cumulative effects reported under the proposed action would be differences in the distribution of social effects across user groups defined in the direct and indirect effects section of this alternative.

Alternative 5: Maximize Motorized Recreation Opportunities

Alternative 5 responds to concerns about access and motorized recreational opportunities. This alternative allows for the greatest motorized access among all action alternative. Specifications include:

- Adds 21.77 miles (33 unauthorized routes) to the NFTS as motorized trails
- Adds 30.56 miles (206 unauthorized routes) to the NFTS as roads to access dispersed recreation sites
- Adds 16.69 miles (29 unauthorized routes) to the NFTS as roads
- Adds 53 acres (2 areas) open to cross-country travel
- Allows 277.77 miles (portions or all of 33 NFTS roads) of mixed use
- Prohibits 7.66 miles (portions or all of 7 NFTS roads) of mixed use
- Opens 4.66 miles (1 closed level 1) NFTS roads
- Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition

Direct and Indirect Effects

This alternative addresses concerns regarding access and motorized recreational opportunities. Cross-county travel would still be prohibited, however it adds the most miles of roads and trails to the NFTS and allows for the greatest amount of mixed use among all action alternatives. This alternative would allow for more motorized access and recreation than alternatives 2 and 6, thus those user groups would experience the greatest social welfare among action alternatives. Alternatively, there would be fewer opportunities for quiet recreation and possibly greater environmental degradation than under the other action alternatives. This could result in less social welfare experienced by those interest groups. The prohibition of cross-county travel would still limit motorized access on the Forest for activities such as dispersed camping, which would allow for greater opportunities for resource conservation and quiet recreation than under the no action.

Economic effects would be negligible. Effects on the social environment are likely to be more prominent. This alternative would yield greater social benefit to advocates of motorized access and recreation than under alternatives 2 and 6, however there would be less social benefit to parties with interests in resource conservation and quiet recreation. The distribution of direct and indirect effects remains unknown; however, benefits would accrue more towards groups with interests in motorized access and recreation than under any other action alternative.

Cumulative Effects

The cumulative effects would be similar to those reported under the proposed action in conjunction with any changes in the levels and distribution of direct and indirect effects resulting from this alternative.

Alternative 6: Refined Proposed Action

The original proposed action was developed to meet the purpose and need described in the NOI. Additional field reconnaissance and analysis of the existing data led to refinement of the proposed action. These refinements were captured in this alternative, which includes the following:

- Removes routes that are overgrown and/or show no sign of use, do not meet the purpose and need, do not meet policy, or are not accessible.
- Removes an errant polygon in T43N R4W S26 MDM.
- Correctly shows the Long Gulch road as a county road.
- Correctly shows 40N51 as ML2.
- Adds several unauthorized routes to make loops.
- Extends the area of proposed mixed use on level 3 roads to connect loops.
- Updates the mileage of mixed use and number of proposed roads.
- Adds a season of use to the Humbug play area (May 1-October 31).
- Corrects the vehicle class for developed river access along Highway 96 to highway legal only.

Other specifications of this alternative include:

- Adds 18.45 miles (30 unauthorized routes) to the NFTS as motorized trails
- Adds 26.05 miles (158 unauthorized routes) to the NFTS as roads to access dispersed recreation sites
- Adds 15.32 miles (25 unauthorized routes) to the NFTS as roads
- Adds 53 acres (2 areas) open to cross-country travel
- Allows 105.21 miles (portions or all of 21 NFTS roads) of mixed use
- Prohibits 7.66 miles (portions or all of 7 NFTS roads) of mixed use
- Opens 4.66 miles (1 closed level 1) NFTS roads
- Prohibits cross-country motorized travel and amends the Forest Plan with the prohibition

Direct and Indirect Effects

The direct and indirect effects of this alternative would be similar to those reported under the proposed action. There would be fewer routes added to the NFTS and fewer acres designated in the play areas. This would further limit access to dispersed recreation sites. A reduction in social welfare compared to that of the proposed action could emerge for individuals concerned with motorized recreation and activities such as dispersed camping. Conversely, advocates of resource conservation and non-motorized recreation would be better off than they would under the proposed action. Thus, a tradeoff among activities on the Forest would still exist and the distribution of effects across stakeholders remains unknown.

Economic effects remain negligible. Direct and indirect effects would be more realized through social indicators. In comparison to the proposed action, advocates of motorized access and recreation would experience a lower degree of wellbeing, while environmentalists and non-motorized enthusiasts would get more social benefits. There are no major differences between this alternative and the proposed action, thus any differences in social and economic effects would be minimal.

Cumulative Effects

This alternative would yield more displacement of motorized recreators than the proposed action, but would serve to improve the lifestyles of individuals concerned with resource conservation and non-motorized recreation. Differences in cumulative effects between the two alternatives would be minimal, and would only include differences in the distribution of social effects across user groups.

Environmental Justice

While American Indian and low-income populations may exist in greater presence in the study area than the general population of the states of Oregon and California, none of the alternatives are expected to have disproportionately high and adverse human health or environmental effects. Impacts to local communities are expected to be negligible, and there is no reason to suspect that any impacts will disproportionately affect minority and low income populations.

3.17.3 Monitoring and Mitigation

There are no specific monitoring and mitigation procedures in place for the social and economic environments. Annual recreation use by activity type would likely differ across alternatives. Changes in recreation use should be measured during future rounds of NVUM surveying. In order to monitor effects on the economic environment, visitation estimates from future NVUM rounds may be used in conjunction with the response coefficients reported above. The estimated effects may then be compared to the baseline reported under the no action alternative in order to determine changes resulting from implementation of the route designation plan. The negative relationship between recreational activities may serve to mitigate some of the economic impacts over time. For example, a change in employment and income resulting from a loss in recreational visits for one activity may be offset by an increase in visits for other activities.

NVUM data should provide an avenue for estimating changes in visitation rates by activity type in the future. Monitoring the conditions of the social environment is less tangible by nature. Currently, the methods available for this analysis do not allow for a quantitative estimate of changes in social welfare across time. As opportunities for recreational activities change, so do the lifestyles, attitudes, values and beliefs of user groups. Forest visitors gain utility from the recreational activities they pursue. A decrease in visits for one activity type would result in a decrease in social benefits for that user group. Alternatively, it is assumed that an increase in visitation rates would yield an increase in benefits. The sum of changes in social benefits across stakeholders yields a net change in social welfare. A negative relationship between some activities may mitigate some of the effects. However, there are no appropriate methods available that would allow for the monitoring of social welfare. Maintaining working relationships with user groups and following public involvement procedures should provide an appropriate means of understanding changes in the social environment in the future.

3.18 Inventoried Roadless Areas and Citizen-Inventoried Roadless Areas

3.18.1 Introduction

This section describes the affected environment and environmental effects on inventoried roadless areas (IRAs) and citizen-inventoried roadless areas (CIRAs) as defined by The Wilderness Society. Measurement indicators quantify how each alternative affects inventoried roadless areas and CIRAs.

3.18.2 Analysis Framework: Klamath National Forest LRMP

Nineteen inventoried roadless areas were considered during development of the Klamath National Forest Land and Resource Management Plan (LRMP). The Record of Decision for the LRMP states:

> No new roads will be constructed within roadless areas in Key Watersheds. All other released roadless areas will be managed according to the direction of the management area in which they occur. (p.3)
>
> Portions of 2 released roadless areas will maintain their roadless characteristics and be managed as the Backcountry Management Area. New road construction will not be permitted in inventoried roadless areas within Key Watersheds that have a roadless character…I determined that, allocating released roadless areas for other multiple use needs such as habitat for Threatened and Endangered species, Late-Successional Reserves and timber production was a higher need than maintaining options for future wilderness or providing additional backcountry opportunities Late-Successional Reserves allow for vegetative management to enhance late-successional habitat which is critical for many Threatened and Endangered Species and could not be provided under wilderness designation. Due to the more pressing needs of Threatened and Endangered species and to low projected demand for wilderness use on the Forest over the next 50 years relative to the current supply, I did not feel that additional wilderness recommendations were warranted. (p. 7)

3.18.3 Effects Analysis Methodology

The analysis of effects on roadless areas was a simple GIS analysis displaying the inventoried roadless areas and the citizen-inventoried roadless areas, layered with the unauthorized routes considered in this DEIS.

3.18.4 Data Sources

- GIS layers of unauthorized routes.
- GIS layers of IRAs and CIRAs (submitted by The Wilderness Society)

3.18.5 Indicators

Measurement indicators for this analysis are:

- Miles of unauthorized routes that would remain available for use in IRAs (alternative 1).
- Miles of roads and trails proposed for addition to the NFTS within IRAs and CIRAs (action alternatives).

3.18.6 Effects Methodology by Action

Alternative proposals were compared against GIS data for each roadless area and CIRA.

3.18.7 Affected Environment/Environmental Consequences

Affected Environment

The Klamath NF has 19 inventoried roadless areas. The LRMP does not prohibit off-road vehicle use in IRAs. Approximately 28 miles of unauthorized routes occur within IRAs.

The Wilderness Society (TWS) has an interest in promoting roadless character within a number of citizen-inventoried roadless areas, which are lands immediately adjacent to existing wilderness areas or IRAs. The LRMP Record of Decision does not prohibit management activities on these lands that would affect roadless conditions. TWS proposes that the Klamath NF limit road-related activities in these areas to preserve their roadless character in order that they may be considered in the future for additions to wilderness, or for management as backcountry or primitive areas.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects of the Prohibition on Cross Country Travel

Alternative 1 allows the continuation of motorized cross-country travel in IRAs, which has the potential to affect 508,000 acres on the KNF. Over time, route proliferation (repeated use of an unauthorized, user-created access route) can result in new routes that can have the appearance of roads. Repeated use can compact soils and remove vegetation, and effectively discourage recovery. While not designated as part of the NFTS, these routes look like roads and provide motorized access into an IRA.

About 28 miles of existing unauthorized routes within IRAs would continue to be used under this alternative.

Direct and Indirect Effects of Adding Facilities to the NFTS

This alternative does not add facilities to the NFTS.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

This alternative does not make any changes to season of use.

Cumulative Effects

There are no ongoing or foreseeable road-related activities located within IRAs or CIRAs. The cumulative effects of this alternative are the same as the direct and indirect effects.

Alternatives 2, 3, 4, 5 and 6

Direct and Indirect Effects of Prohibition on Cross-country Travel

Closing the Forest to cross-country travel would stop the creation of additional unauthorized routes, which would eliminate the risk of new routes being created in both IRAs and CIRAs. In the short term, until restoration occurs, unauthorized routes not added to the NFTS will appear as roads. Passive restoration of unauthorized routes is discussed in the soils, hydrology, and wildlife sections.

Direct and Indirect Effects of Adding Facilities to the NFTS

None of the action alternatives proposed to add roads or motorized trails within IRAs to the NFTS.

Alternative 3 does not proposed to add routes to the NFTS. Alternative 4 does not propose to add any routes within CIRAs. Alternatives 2, 5 and 6 propose to add routes within CIRAs to the NFTS (Table 141).

All of the proposed routes are short; two are about 0.4 mile long and the rest are less than 0.2 mile in length. All proposed routes are associated with existing ML 2 roads. Most are at the edges of CIRAs and provide motorized access to camping sites that have been in place and used by the public for many years. Several routes occur in areas with a number of ML2 roads.

Table 141. Numbers and miles of routes within CIRAs proposed for addition to NFTS

Alternative	Routes within CIRAs Proposed for Addition to NFTS	Miles
Alternative 2 –10 routes	51-35	.09
	51-36	.09
	51-37	.09
	51-38	.02
	51-41	.02
	54-24	.05
	54-25	.09
	54-61	.09
	54-62	.08
Total Miles for Alt 2: 0.71	54-63	.09
Alternative 3	No routes added to NFTS	0
Alternative 4	No added routes within CIRAs	0
Alternative 5 – 16 routes	51-28	.11
	51-28a	.03
	51-41	.02
	51-41a	.26
	51-41b	.04
	54-18	.44
	54-43	.09
	54-43a	.04
	54-44	.04
	55-26	.04
	55-28	.03
	55-46	.06
	55-63	.06
	55-64	.04
	55-65	.41
Total Miles for Alt 5: 1.82	55-67	.11
Alternative 6 – 8 routes	51-41	.02
	52-08	.04
	54-18	.44
	54-24	.05
	54-43	.09
	54-43a	.04
	54-65	.19
Total Miles for Alt 6: 1.03	55-44	.16

Depending on the alternative, in the long term between 0.7 and 1.8 miles of short spur routes in CIRAs would not revegetate and return to a more natural appearance. In areas where roadless character is intact, these routes represent a long term effect on that character.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Changes to the NFTS within IRAs or CIRAs do not affect these areas.

Cumulative Effects

There are no ongoing or foreseeable road-related activities located within IRAs or CIRAs. The cumulative effects of these alternatives are the same as the direct and indirect effects.

Compliance with the Klamath LRMP and Other Direction

Alternative 1 meets the requirements of the Klamath LRMP but is inconsistent with direction in the Travel Management Rule.

The action alternatives propose a Forest Plan amendment that will prohibit cross-country motorized travel; this will bring the LRMP into compliance with the Travel Management Rule.

3.19 Geological Resources

3.19.1 Introduction

The Klamath National Forest (KNF) currently has no restrictions on off-highway vehicle (OHV) use on nearly 70 percent of the National Forest System lands. This unrestricted use is not fully consistent with the Travel Management Rule, CFR Part 212, Subpart B. Limiting OHV use to National Forest Transportation System (NFTS) roads by prohibiting motorized cross-country travel, is needed to protect resources and meet the regulatory standards. This creates a need to provide motorized access to dispersed recreation opportunities and a diversity of motorized recreation opportunities that may not be currently available via an NFTS route. This will require limited changes to the KNF transportation system. There is also a need to ensure the alterations to the regulations on OHV use on the Forest include considerations of social compatibility between affected communities and motorized off-highway vehicle use.

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 National Forest System lands. Geological resources include caves, paleontological resources, geological special interest areas, and ground water. Geological hazards can impact public safety on National Forest System 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 National Forest System lands. Ground water is a valuable resource that may be affected by project planning. Mining and minerals, which are included in the management of National Forest System 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 and there could be a threat to public health and safety.

3.19.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

The following statutory authorities govern geologic resources and services activities essential to Forest Service programs:

FSM-2880.11 - Statutory Authority

Organic Administrative Act of June 4, 1897, as Amended (30 Stat. 34, as Supplemented and Amended; 16 U.S.C. 473-478, 482-482(a), 551. (FSM 2501.1.) This act authorizes the Secretary of Agriculture to issue rules and regulations for the occupancy and use of the National Forests. This is the basic authority for issuing special use permits for the collection of vertebrate paleontological resources for scientific and educational purposes on National Forest System lands.

Preservation of American Antiquities Act of June 8, 1906 (34 Stat. 225; 16 U.S.C. 431 et seq.). (FSM 2361.01.) This act authorizes permits for archeological and paleontological exploration involving excavation, removal, and storage of objects of antiquity or permits necessary for investigative work requiring site disturbance or sampling which results in the collection of such objects.

Multiple Use -- Sustained Yield Act of June 12, 1960 (MUSY) (74 Stat. 215; 16 U.S.C. 528-531). (FSM 2501.1.) This act requires due consideration for the relative values of all resources and implies that the administration of nonrenewable resources must be considered.

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, ground water recharge, and water-quality management, as well as the conservation and proper use of land.

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. Ground water information; including that concerning recharge and discharge areas, and information on geologic conditions that affect ground water quality; is needed to carry out purposes of these acts.

Wilderness Act of September 3, 1964 (78 Stat. 890; 16 U.S.C. 1131-1136). (FSM 2501.1.) This act describes a wilderness as an area which may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value. These geological features are generally identified for wilderness classification purposes.

National Forest Roads and Trails 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.

Wild and Scenic Rivers Act of October 2, 1968 (82 Stat. 906 as Amended; 16 U.S.C. 1271-1287). This act states that it is the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstanding scenic, recreation, geologic, fish and wildlife, cultural, or other similar values shall be preserved in free-flowing condition.

National Environmental Policy Act of January 1, 1970 (NEPA) (83 Stat. 852 as Amended; 42 U.S.C. 4321, 4331-4335, 4341-4347). (FSM 1950.2.) This act directs all agencies of the Federal Government to utilize a systematic interdisciplinary approach which will ensure the integrated use of the natural and social sciences in planning and in decision making which may have an impact on man's environment. Geology is one of the applicable sciences.

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 ground water protection and geologic stability.

Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531-1536, 1538-1540). This act provides for the conservation of endangered and threatened species and their habitats.

Archeological and Historical Conservation Act of 1974 (AHCA) (88 Stat. 174; 16 U.S.C. 469). (FSM 2361.01.) This act requires all Federal agencies to notify the Secretary of the Interior when a construction project threatens to irreparably harm or destroy significant scientific, prehistoric, historic, or archeological data. The paleontological resource may have significant scientific and historic value.

Disaster Relief Act of 1974 (88 Stat. 143; 42 U.S.C. 5121, 5132). Section 202(b) states that the President shall direct appropriate Federal agencies to ensure timely and effective disaster warnings for such hazards as earthquakes, volcanic eruptions, landslides, and mudslides. The Federal Register, Vol. 42, No. 70 of April 12, 1977, "Warnings and Preparedness for Geologic Related Hazards," implies coordination with the U.S. Geological Survey in such warnings.

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.

Resource Conservation and Recovery Act of 1976 (RCRA) (90 Stat. 2795; 42 U.S.C. 6901) as Amended by 92 Stat. 3081. This act, commonly referred to as the Solid Waste Disposal Act, requires protection of ground water quality and is integrated with the Safe Drinking Water Act of December 16, 1974, and Amendments of 1977 (42 U.S.C. 300(f)) (FSM 7420.1).

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.

Archaeological Resource Protection Act (ARPA) October 31, 1979 (93 Stat. 721; 16 U.S.C. 470 aa). This act protects archeological resources, and prohibits the removal, sale, receipt, and interstate transport of archeological resources obtained illegally from public lands. Archeological resources include paleontological resources in context with archeological resources. Also, this act authorizes the Secretary of Agriculture to issue permits for archeological research, investigations, studies, and excavations.

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.

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.

FSM-2880.12 - Executive Orders

The following Executive Orders provide direction for geologic resources and services activities on National Forest System lands:

Executive Order 11593, Protection and Enhancement of Cultural Environment, May 13, 1971 (3 CFR 559, 1971-75 Compilation). This Executive Order directs agencies to preserve, restore, and maintain the historic and cultural environment of the Nation.

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.

Other Management Directives

Klamath National Forest Land and Resource Management Plan (LRMP): The KNF LRMP geology standards and guidelines provide a framework for the geologic resources and hazards evaluation and geologic report content. The geologic hazards include naturally occurring asbestos and unstable lands. The geologic resources outlined in the standards and guidelines include rock sources, cave resources, and

water. The LRMP also includes the Aquatic Conservation Strategy (ACS) (appendix A) which emphasizes a watershed-based analysis of the effect of existing and proposed activities in the watershed on water quality (including sediment delivery).

3.19.3 Effects Analysis Methodology

For ease of documentation and understanding, the effects of the alternatives will be described separately for three discreet actions and then combined to provide the total direct and indirect effects of each alternative (see below). The combination of these discreet actions will then be added to the past, present, and reasonably foreseeable actions in the cumulative effects analysis. The three discreet actions common to all action alternatives are: (1) The prohibition of cross-country motorized vehicle travel; (2) The addition of facilities (unauthorized roads, trails, and/or areas) to the National Forest Transportation System (NFTS), including identifying seasons of use and vehicle class; and (3) Changes to the existing NFTS. The effects analysis will focus on the methodology and indicators for addressing the direct and indirect effects of each of the three actions and the cumulative effects of implementing an alternative as a whole.

3.19.4 Geo-indicators

Geologic changes occur not only over spans of geologic time, but also at observable intervals of time that can be monitored or measured. Geo-indicators have been developed by the International Union of Geological Sciences as high-resolution measures of short-term changes in the geologic environment, which are significant for environmental monitoring and assessment for use in environmental reporting and ecosystem management (FSM 2880.61, paragraph 2).

The following indicators will be used to compare the differences in geological effects between alternatives.

1. Slope Stability

Landslides and slope stability is a concern both in a roadway's role in potential landslides and how landslides will affect a roadway. Roads affect the hillslope hydrology and can concentrate surface runoff onto sensitive ground increasing the potential for landslides. Damage to roadways as a direct or indirect result of slope instability is a potential physical hazard to unsuspecting motorist. The sediment delivered to streams and hillslopes by landslide activity can be exacerbated by the presence and use of roadways.

The assessment for geological analysis in this document will use the following two scales as described in the Slope Stability Reference Guide for National Forests (1994). The Forest may use any approved geological methodology to analyze slope stability, but scale must be at these levels. The manual can be accessed at the following site: http://fsweb.wo.fs.fed.us/mgm/geology_notebook.html.

A Level I analysis will be performed to highlight areas of concern that may have geological hazards. Areas of concern for slope stability are known active landslides, inner gorges and steep (greater than 65 percent slopes), granitic bedrock are used for this analysis. These are areas that, in the Klamath National Forest, are prone to landslides when disturbed. This disturbance includes the change in hillslope hydrology by road cuts and the direct disturbance of motorized travel. In the FSM 2880 a Level I analysis equates to an Order 3 analysis. Level I analysis uses data gathered at a watershed scale (1:24,000 scale), such as aerial photos and geomorphic mapping (GIS coverage). Any alternative that identifies unauthorized roads and trails added through areas with slope stability concerns are assessed at the project level or Level II scale. Level II analysis in the Slope Stability Reference Guide for National Forests (1994) equates to Order 2 scale in FSM 2880. Level II analysis uses data collected at a project scale (1:600 to 1:36,000 scale) and includes field evaluations and measurements.

2. Asbestos Hazard

Asbestiform minerals are naturally-occurring fibrous silicate minerals that are commonly associated with ultramafic rock, including serpentinite. In order for asbestos to be a public health issue it must be released as dust into the air and inhaled by a human. The greatest risk is in the immediate area of the disturbance of ultramafic rock such as on an off-highway vehicle while riding on a ground surface that contains asbestos. This exposure has been shown to be hazardous on other public lands in California (e.g. El Dorado County). Asbestos exposure has been associated with several forms of lung and esophagus diseases.

Areas underlain by serpentinite or ultramafic rock, which may contain asbestos, will be delineated at the 1:24000 scale. If there are proposed unauthorized routes in these areas, site-specific analysis, which may include testing the ground surface material, will be done to determine if ground surface poses a health risk. Risks may be mitigated by resurfacing or speed limitations on the routes.

3. Abandoned Mine Hazard

There is a potential physical hazard to the users of roadways and trails in close proximity of abandoned and active mines. These include falling danger, asphyxiation due to trapped gases in the mines, and damaged roadways due to mine shaft roof collapse.

The length of routes within a 500 foot buffer of a known mine were considered to be affected by this geo-indicator and will be analyzed at a project level. The number of mines in ground with less than 35 percent slope outside of the wilderness was used in the motorized cross-country travel analysis. The project level analysis will focus on open adits, shafts, or other features that may pose a falling or asphyxiation hazard. Any risks associated with abandoned mines in close proximity to proposed routes will be mitigated on a site-specific basis.

4. Groundwater

Groundwater sensitive areas are areas within a municipal groundwater basin (California Department of Water Resources) or in zones of permeable rock (alluvial deposits, fault zones, young lava flows, and caves). An issue of concern with roadways and groundwater is potential groundwater pollution as a result of fluids leaking from vehicles or spills as a result of accidents. The risk to groundwater quality by the addition of routes to the NFTS or changing the class of existing NFTS routes will have a negligible impact on water quality. Vehicle accidents are uncommon on NFTS routes and any spills would be small. In light of this, the impact to groundwater will not be addressed further in this analysis.

5. Unique Geologic Areas

Easier access to special interest areas, natural research areas and caves may increase the frequency of visits to the location. This in itself is not detrimental to the resource. However, increased access to unique geologic areas has the potential to increase vandalism in sensitive areas. There has been little to no notable damage to the resource thus far and none of the routes in the alternatives run through the unique geologic areas. Therefore, the risk is minimal and will not be addressed further in this analysis.

6. Paleontological Resources

There are sparse paleontological resources on the Forest. Radiolarian fossils in chert deposits are the most common fossils, although there are occasional fossils in the limestone bedrock. Plant fossils have been found in the Western Cascades, such as the Western White Pine bark molds at the Fourmile Hill Tree Molds Geologic Special Interest Area. Pleistocene-age vertebrate fossils have been found in a few caves on the Forest. There has been little to no notable damage to the paleontological resources and in general the routes in the alternatives avoid potential fossil-bearing areas. Therefore, the risk of destruction is minimal and will not be addressed further in this analysis.

Temporal and Spatial Boundaries

The timeframes for this analysis are based on measurable changes in landslide potential in the Forest. The short-term timeframe is 1-5 years. This is the amount of time it typically takes for revegetation to occur after a disturbance has been discontinued. At 5 years the root support from the vegetation begins to stabilize the ground and landslide potential begins to decrease measurably. The long-term timeframe of 50 year is also based on revegetation. The large trees will provide significant root support to unstable land and the hillslope hydrology has recovered. This will substantially reduce the landslide potential of an unstable hillslope. The ramifications of the proposed action and alternatives are spread throughout the Forest. Therefore, the spatial scale of the analysis is the Forest boundary. The Forest is broken into 7th field watersheds for the slope stability cumulative effects analysis, but all of the watersheds discussed are within the Forest boundaries.

3.19.5 Data Sources

- Route inventories collected in Step 1 of Travel Management and associated tabular data sets.
- Forest bedrock geology and geomorphic mapping.
- Aerial photos.
- Anecdotal information documenting the time required for passive restoration of routes closed to motor vehicle traffic (recovery time may vary based on precipitation, elevation, aspect, and other factors).

3.19.6 Geology Resource Methodology by Action

Figure used in this analysis focused on the land area considered open and available for cross-country motorized travel (508,000 acres). These lands are outside of wilderness and other land allocations where motorized travel is not allowed, and less than 35 percent slope.

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

Direct effects: Direct effects of the prohibition of cross-country travel include the cessation of physical displacement of ground surface and the disturbance of unstable land off of the motorized routes. The physical disturbance of ultramafic ground surface will be eliminated off of the motorized routes. Motorized access to and through abandoned mine sites will be reduced. Also, no additional routes will be created by the users.

Indirect effects: Concentration of surface runoff by user created routes in unstable areas will be reduced, which will decrease the landslide potential. There will be a decrease of sediment delivery to stream channels by landslide or other mass wasting processes. The elimination of cross-country motorized travel through ultramafic ground cover will reduce the public's potential exposure to asbestiform minerals. The exposure to mine collapse hazard or a falling risk from shafts, adits and other mining excavations off the motorized travel route will be eliminated.

Short-term timeframe: 1 – 5 years.

Long-term timeframe: 50 years.

Spatial boundary: Forest.

Indicator(s): Acres of land available to motorized cross-country travel (non-wilderness with slopes of less than 35 percent) displayed by acres affected by geo-indicators (unstable lands, asbestos or abandoned mine hazards).

Methodology: GIS analysis of the area available for cross-country motor vehicle use affected by geo-indicators.

Rationale: FSM 2880

2. Direct and indirect effects of adding facilities to the NFTS

Direct Effects: The unauthorized routes already exist in the landscape therefore the direct effects of unauthorized routes have already occurred and are on-going. The direct effects include the physical displacement of areas underlain by ultramafic rock and roads built across landslides. Motorized access to and through abandoned mine sites may be increased. The routes added to the NFTS will be evaluated to determine the type and amount of maintenance required to minimize the concentration of surface runoff on to the hillslopes.

Indirect Effects: The indirect effects of unauthorized routes are already occurring. The unauthorized routes accessing unstable lands can increase the sediment delivered to streams through landslides or other mass wasting processes. Motorized travel through ultramafic rock may lead to exposure to asbestiform minerals if present in the rock/soil. Routes that access mines sites may pose a collapse hazard or a falling risk from shafts, adits and other mining excavations.

Short-term timeframe: 1 – 5 years.

Long-term timeframe: 50 years.

Spatial boundary: Forest.

Indicator(s): Miles of unauthorized routes displayed by miles in areas identified as having geo-hazards or resource concerns (Unstable lands, asbestos or abandon mine hazards).

Methodology: GIS analysis of existing unauthorized routes compared to GIS layers displaying identified geo-hazards or resource concerns (unstable lands, asbestos or abandoned mine hazards).

Rationale: FSM 2880

3. Changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

The changes to the NFTS will be the addition or removal of mixed-use on the existing NFTS. Mixed-use allows for non-highway legal vehicle use on NFTS routes. The other change to NFTS is the opening of current maintenance level 1 (closed to public) to public use.

Direct Effects: The direct effects include the increased physical displacement of ultramafic rock. Motorized public access to and through abandoned mine sites may be increased.

Indirect Effects: Motorized travel through ultramafic rock may lead to exposure to asbestiform minerals if present in the rock/soil. Routes accessing abandoned mine sites or caves may pose a collapse hazard or a falling risk from shafts, adits and other mining excavations.

Short-term timeframe: 1 - 5 years.

Long-term timeframe: 50 years.

Spatial boundary: Forest.

Indicator(s): Miles of changed routes displayed by miles in areas identified as affected by geo-indicators (unstable lands, asbestos or abandoned mine hazards).

Methodology: GIS analysis of changed routes compared to GIS layers displaying affects by geo-indicators.

Rationale: FSM 2880

4. Cumulative Effects

Cumulative effects includes the impact of the proposed action added to the effect of past, present and reasonably foreseeable future actions. The cumulative effects will be discussed in reference to Alternative 1 - No Action. Motorized routes will remain a permanent part of the landscape and will not recover without treatment. The proposed actions do not include any treatment, only prohibiting motorized travel on the routes. The effects of the unauthorized routes on landslide will remain the same as current conditions within the long-term timeframe. The impacts to geologic resources such as unique geologic areas and groundwater may be affected by the proposed actions. Disturbance of areas with naturally occurring asbestos and abandoned mines may also be influenced over the long-term timeframe.

The past events include the construction of the existing road system (unauthorized and system roads). The present and reasonable foreseeable actions used for the cumulative effects analysis include the decommissioning of 30.37 miles of roads, the addition of 26.08 and 15.74 miles of ML2 and ML1 class roads respectively. This is a net gain of 11.45 miles of roads to the NFTS.

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

Long-term timeframe: 50 years.

Spatial boundary: Forest.

Indicator(s): Sum of the miles of unauthorized routes being added and existing routes being changed to mixed-use, as well as routes being added to NFTS by present and future actions, in areas affected by the geo-indicators (unstable lands, asbestos or abandon mine hazards).

Methodology: GIS analysis of existing unauthorized routes, changed routes and routes being added by present and future actions compared to GIS layers displaying identified geo-indicators.

Rationale: FSM 2880

3.19.7 Affected Environment/Environmental Consequences

Affected Environment

The KNF is easily separated geographically – and geologically – into the Klamath Mountains to the west and the Cascade Mountains on the east side of the Forest. The Klamath Mountains are dominated by a series of accreted terranes that have been folded and faulted into the rugged landscape. The Mesozoic and Paleozoic (200-500 million years old) rocks are composed of varying lithologies including metamorphosed volcanic and sedimentary rocks, limestone/marble, schist and ultramafic rock. There is a potential for naturally occurring asbestos hazard in the ultramafic rocks, specifically the landslide-prone serpentinite. Extensive granitic intrusion of the terranes occurred during the Jurassic Period (200 – 150 million years ago). The resulting contact metamorphism can produce asbestiform minerals. Areas underlain by granitic bedrock are highly erodible and dissected by drainage networks and relatively unstable lands. Landslides in the steep Klamath Mountains are common and often associated with roads.

The Cascade Mountains consist of Tertiary to Quaternary (30 million years ago to recent) volcanic rocks such as lava flows, tuffs, breccias, and volcaniclastic rocks. The terrain is significantly less rugged than the Klamath Mountains. There are two chains of volcanoes, one extending northward from Mount Shasta to Goosenest Mountain and Eagle Rock, and the other extending Northeast from Mount Shasta to Medicine Lake. Lava flows in Shasta Valley (Pluto Cave Basalt) and Butte Valley (Butte Valley Basalt) are important groundwater aquifers. Quaternary-aged north-trending faults, related to basin and range extension, occurring between Meiss Lake and Lower Klamath Lake create closed basins such as Butte Valley and Antelope Sink.

In the Klamath Mountains the unauthorized routes and cross-country travel are contributing to ground cover disturbance on the hillslopes and to the streams. The Humbug area on the Scott River Ranger District is chiefly in granitic bedrock that is dissected and soils that are highly erodible. The area is riddled with poorly-drained unauthorized routes that are delivering sediment to Humbug Creek. The routes are heavily gullied and have steep sections (20 percent grades). Many of the routes have low water crossings that are directly contributing sediment to tributaries of Humbug Creek. There is also evidence of erosion and sedimentation as a result of cross-country motorized travel.

Vehicles creating routes on steep hillslopes generate sediment that is being transported to the streams. Due to lack of vegetation, these areas are also gullied, which amplifies the sediment delivery to the streams. The Humbug area was a mining district and contains many abandoned mines. The mines investigated in the area appeared to be small earth workings and no adits or shafts were found. This is not to say that the risk of such hazards is small since a detailed field inventory is not available. Caution should still be used when proposing activities that increase access to such areas. Throughout much of Klamath Mountains there are many small unauthorized routes used to access dispersed recreation sites

that are in ultramafic bedrock. These routes do not have any measure implemented to mitigate the potential for exposure to any asbestos in the disturbed ground surface. Current activities in the Forest that generate dust include logging, road traffic, fire line construction, rock pit development and road maintenance.

The routes in other areas of the Forest do not have a significant risk of impacts to the geo-indicators. The routes in unstable ground are concentrated in the Humbug area. Routes in ultramafic rock access dispersed recreation sites. The routes to dispersed recreation sites are short (<0.4 miles long), so the effects can be mitigated with Forest-implemented speed reductions.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects of the Prohibition on Cross Country Travel

Cross-country motorized travel is not prohibited in this alternative, and use of unauthorized routes would not be restricted. There are 28 miles of unauthorized routes and 3,325 acres of land available for motorized cross-country travel through unstable land. This increases the landslide potential for those areas. Cross-country motorized travel allows for surface disturbance to occur on over 58,000 acres of ultramafic bedrock. Existing unauthorized routes underlain by serpentine or ultramafic bedrock (12 miles total) potentially expose the public to hazardous asbestiform minerals. Users of OHVs are located close to the road surface and directly exposed to dust generated by vehicles. OHV users on existing routes in ultramafic rock (where speeds are higher and more dust is generated) may be directly exposed to asbestos dust.

Motorized access to abandoned mines may present public health and safety issues. There are over 200 known abandoned mines in the areas available for cross-country motorized travel (non-wilderness with less than 35 percent slopes). These mines may include shafts, holes and adits that pose a collapse or falling hazard. The U.S. Mine Safety and Health Administration reported that between 2003 and 2007 there were 29 fatalities as a result of motorized travel in mining areas. Fortunately, there have been no recent reported accidents related to abandoned mines on the Klamath National Forest.

Direct and Indirect Effects of Adding Facilities to the NFTS

No facilities would be added to the NFTS under this alternative.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes are made to class of use or season of use under this alternative.

Cumulative Effects

There are currently 28 miles of unauthorized routes through unstable lands. Present and future actions will add 3.3 miles of routes onto the NFTS, and remove 6.9 miles through decommissioning activities, for a total of 24.4 miles of routes and roads open for use in unstable land. Motorized cross-country travel also allows for the use of 3,325 acres of unstable land. The routes through unstable areas can concentrate surface runoff and increase landslide potential. The landslide potential on these lands is also increased due to the large area of unstable land that is open for disturbance from motorized travel.

The alternative allows for the continued use of 12 miles of routes through ultramafic rock and present and future activities remove 2.7 miles, for a total of 9.3 miles of roads through ultramafic rock open for use. There is a risk of exposure to asbestos dust for visitors using these roads at rates of speed that generate dust. The Forest has 58,000 acres of land in ultramafic rock that are open to motorized cross-country travel. The risk of asbestos dust exposure is increased for those who used vehicles for cross-country travel in these areas.

There are currently 18 miles of road open for use within 500 feet of a known mine. Present and future actions will not add or subtract from this number. There are 216 known abandoned mines in the area available for motorized cross-country travel. Abandoned mine hazards associated with driving through the area is increased because of cross-country motorized travel and the number of routes in close proximity to abandoned mines. The increased access to the mine areas can also increase the opportunity for people to enter the mines, escalating the risk of accidents and fatalities.

Alternative 2 – Proposed Action

Direct and Indirect Effects of the Prohibition on Cross Country Travel

This alternative closes 3,325 acres of unstable land to motorized cross-country travel. The effects from the unauthorized routes have already occurred. Once cross country travel is prohibited, those routes not added to the NFTS will passively or naturally recover through revegetation and a gradual decompaction of remnant soil. Sediment from poorly drained routes may still be delivered to streams over the long term, and the risk of landslides could still be present in cases of altered hillslope hydrology. Overall, the landslide potential on these lands should be reduced.

Prohibition of motorized cross-country travel would decrease the public's exposure to asbestos dust by eliminating motorized travel over the 58,000 acres of serpentine or ultramafic bedrock reducing the risk of exposure to asbestiform minerals.

Hazards related to abandoned mines would be greatly reduced because of the elimination of motorized travel in the areas of 216 known abandoned mines.

Direct and Indirect Effects of Adding Facilities to the NFTS

Over time, maintenance performed on routes added to the NFTS could slightly reduce the risk of landslides. Six miles of the existing unauthorized routes added to the NFTS are underlain by ultramafic rock. These are all short (< 0.5 mile), rough surfaced routes (unsuitable for high vehicle speeds) that access camping sites. Low vehicle speeds on these routes would reduce the risk of exposure to asbestiform minerals (if present). This alternative does not add any routes within 500 feet of a known abandoned mine. The two OHV areas proposed for addition to the NFTS are not underlain by ultramafic rock, and do not contain any known abandoned mines.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Adding mixed use on 14 miles of roads in ultramafic rock could affect exposure to asbestiform minerals since users of OHVs are located close to the road surface and directly exposed to dust generated by vehicles. The KNF is conducting testing on roads in ultramafic rock proposed for mixed use to determine whether asbestos is present. Once testing is complete, information will be provided to the public regarding the potential for exposure on these mixed use roads.

The addition of mixed use on routes through unstable lands should have no effect on landslide risk.

Cumulative Effects

This alternative will add 19 miles of unauthorized routes in unstable lands to the NFTS. Ongoing and foreseeable road-related actions will add 3.3 miles of routes onto the NFTS, and remove 6.9 miles through decommissioning, for a total of 15.4 miles of roads in unstable land added to the NFTS. The ongoing projects include mitigation measures that minimize impacts from road construction on landslide risk. Over time, maintenance performed on routes added to the NFTS could slightly reduce the risk of landslides.

This alternative adds 6 miles of roads and 14 miles of mixed use in ultramafic rock. Ongoing and foreseeable actions remove 2.7 miles, for a total of 17.3 miles of roads in ultramafic rock available for use by OHVs. Testing on the routes to be added to the NFTS will determine whether there is a risk of exposure to asbestiform dust.

Alternative 3 – Cross-Country Travel Prohibition Only – No Changes to the Current NFTS

Direct and Indirect Effects of the Prohibition on Cross Country Travel

Effects of the prohibition of cross country travel are the same as discussed for Alternative 2. Beneficial effects include a reduction in landslide risk, decrease in exposure to asbestos dust, and reduction in risk of encountering abandoned mine hazards.

Direct and Indirect Effects of Adding Facilities to the NFTS

No facilities would be added to the NFTS under this alternative.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

No changes are made to class of use or season of use under this alternative.

Cumulative Effects

This alternative will not add unauthorized routes in unstable lands. Present and future actions will add 3.3 miles of routes onto the NFTS, and remove 6.9 miles through decommissioning, for a net gain of 3.6 miles of roads in unstable land.

Ongoing and foreseeable road-related activities remove 2.7 miles of roads in ultramafic rock. The risk of asbestos dust exposure would be slightly reduced with the reduction of road mileage in ultramafic rock.

This alternative does not add any routes within 500 feet of a known abandoned mine, and none will be added through known future actions.

Alternative 4 – Maximize Quiet Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross Country Travel

Effects of the prohibition of cross country travel are the same as discussed for Alternative 2. Beneficial effects include a reduction in landslide risk, decrease in exposure to asbestos dust, and reduction in risk of encountering abandoned mine hazards.

Direct and Indirect Effects of Adding Facilities to the NFTS

No routes through ultramafic rock, on unstable lands, or within 500 feet of a known abandoned mine are added to the NFTS in this alternative.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

The addition of mixed use on routes through unstable lands should have no effect on landslide risk.

Mixed use on 14 miles of roads in ultramafic rock could affect exposure to asbestiform minerals since users of OHVs are located close to the road surface and directly exposed to dust generated by vehicles. The KNF is conducting testing on roads in ultramafic rock proposed for mixed use to determine whether asbestos is present. Once testing is complete, information will be provided to the public regarding the potential for exposure on these mixed use roads.

Cumulative Effects

Present and future actions will add 3.3 miles of routes in unstable lands onto the NFTS, and remove 6.9 miles through decommissioning, for a net loss of 3.6 miles of roads in unstable lands.

Present and future actions remove 2.7 miles of roads and add 14 miles of mixed use on roads in ultramafic rock, for an increase of 11.7 miles of roads in ultramafic rock that will be available for OHV use.

Alternative 5 – Maximize Motorized Recreation Opportunities

Direct and Indirect Effects of the Prohibition on Cross Country Travel

Effects of the prohibition of cross country travel are the same as discussed for alternative 2. Beneficial effects include a reduction in landslide risk, decrease in exposure to asbestos dust, and reduction in risk of encountering abandoned mine hazards.

Direct and Indirect Effects of Adding Facilities to the NFTS

Over time, maintenance performed on routes added to the NFTS could slightly reduce the risk of landslides. Five miles of the existing unauthorized routes added to the NFTS are underlain by ultramafic rock. These are all short (< 0.5 mile) rough surfaced routes (unsuitable for high vehicle speeds) that access camping sites. Low vehicle speeds (less than 15 mph) on these routes would reduce the risk of exposure to asbestiform minerals (if present). The alternative does not add any routes within 500 feet of a known abandoned mine. There are no mixed use routes being proposed within the 500 foot buffer of abandoned mines. The two OHV areas proposed for addition to the NFTS are not underlain by ultramafic rock, and do not contain any known abandoned mines.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Adding mixed use on 22 miles of roads in ultramafic rock could affect exposure to asbestiform minerals since users of OHVs are located close to the road surface and directly exposed to dust generated by vehicles. The KNF is conducting testing on roads in ultramafic rock proposed for mixed use to determine whether asbestos is present. Once testing is complete, information will be provided to the public regarding the potential for exposure on these mixed use roads.

The addition of mixed use on routes through unstable lands should have no effect on landslide risk.

Cumulative Effects

This alternative will add 16 miles of unauthorized routes in unstable lands. Ongoing and foreseeable road-related actions will add 3.3 miles of routes in unstable lands to the NFTS, and remove 6.9 miles through decommissioning activities, for a net increase of 12.4 miles. The ongoing projects include mitigation

measures that minimize impacts from road construction on landslide risk. Over time, maintenance performed on routes added to the NFTS could slightly reduce the risk of landslides.

This alternative adds 5 miles of roads and 22 miles of mixed use in ultramafic rock. The present and future actions remove 2.7 miles, for a net increase of 25.3 miles of roads in ultramafic rock that will be available for OHV use. Testing on the routes to be added to the NFTS will determine whether there is a risk of exposure to asbestiform dust.

Alternative 6 – Refined proposed action

Direct and Indirect Effects of the Prohibition on Cross Country Travel

Effects of the prohibition of cross country travel are the same as discussed for Alternative 2. Beneficial effects include a reduction in landslide risk, decrease in exposure to asbestos dust, and reduction in risk of encountering abandoned mine hazards.

Direct and Indirect Effects of Adding Facilities to the NFTS

Over time, maintenance performed on routes added to the NFTS could slightly reduce the risk of landslides. Six miles of the existing unauthorized routes added to the NFTS are underlain by ultramafic rock. These are all short (< 0.5 mile) rough surfaced routes (unsuitable for high vehicle speeds) that access camping sites. Low vehicle speeds (less than 15 mph) on these routes would reduce the risk of exposure to asbestiform minerals (if present). The alternative does not add any routes within 500 feet of a known abandoned mine. There are no mixed use routes being proposed within the 500 foot buffer of abandoned mines. The two OHV areas proposed for addition to the NFTS are not underlain by ultramafic rock, and do not contain any known abandoned mines.

Direct and Indirect Effects of Changes in Existing Season and Class of Use

Adding mixed use on 9 miles of roads in ultramafic rock could affect exposure to asbestiform minerals since users of OHVs are located close to the road surface and directly exposed to dust generated by vehicles. The KNF is conducting testing on roads in ultramafic rock proposed for mixed use to determine whether asbestos is present. Once testing is complete, information will be provided to the public regarding the potential for exposure on these mixed use roads.

The addition of mixed use on routes through unstable lands should have no effect on landslide risk.

Cumulative Effects

This alternative will add 16 miles of unauthorized routes in unstable lands. Ongoing and foreseeable road-related actions will add 3.3 miles of routes onto the NFTS, and remove 6.9 miles through decommissioning, for a net increase of 12.4 miles. The ongoing projects include mitigation measures that

minimize impacts from road construction on landslide risk. Over time, maintenance performed on routes added to the NFTS could slightly reduce the risk of landslides.

This alternative adds 5 miles of unauthorized routes and 9 miles of mixed use roads in ultramafic rock. The present and future actions remove 2.7 miles, for a net increase of 11.3 miles of roads in ultramafic rock that will be available for OHV use. Testing on the routes to be added to the NFTS will determine whether there is a risk of exposure to asbestiform dust.

Summary of Effects Analysis across All Alternatives

The measurement indicators for slope stability, asbestos hazard, and abandoned mine hazard (Table 142 - Table 144) were based on the number of miles and acres affected by the geo-indicators for each alternative.

Table 142. Acres available for cross-country motorized travel with geologic measurement indicators by alternative

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Geologic Hazards	Slope Stability (acres)	3,325	0	0	0	0	0
	Ultramafic Rock (acres)	58,390	0	0	0	0	0
	Abandoned Mines (acres)	3,895	0	0	0	0	0
Total Acres		**61,715**	**0**	**0**	**0**	**0**	**0**

Table 143. Miles of unauthorized routes/roads and trails proposed for addition to the NFTS with geologic measurement indicators by alternative[a]

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Geologic Hazards (miles)	Slope Stability	28	19	0	0	16	16
	Ultramafic Rock	12	6	0	0	5	5
	Abandoned Mines	2	0	0	0	0	0
Total Miles		**42**	**25**	**0**	**0**	**21**	**21**

a - While Alternative 1 does not 'add' any unauthorized routes to the system, it does not restrict their use by the public. Therefore, alternative 1 includes all unauthorized routes.

Table 144. Changes to the NFTS with geologic measurement indicators by alternative

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Geologic Hazards (miles)	Slope Stability	0	8	0	9	23	8
	Ultramafic Rock	0	14	0	14	22	9
	Abandoned Mines	0	0	0	0	0	0
Total Miles		**0**	**22**	**0**	**23**	**45**	**17**

Alternative 1 has the highest impact on geologic resources and hazards because it allows motorized cross-country travel. It has the highest landslide potential and asbestos and mine hazard exposure risk. Alternative 5 has a reduced exposure to hazards and landslide potential compared to Alternative 1, but the impacts on unstable lands and asbestos hazard are still high. Alternatives 2 and 6 are similar in the landslide potential risk and asbestos and abandoned mine hazards. The impacts to geo-indicators are smaller than in alternatives 1 and 5. Alternative 4 has low impacts due to the few miles of routes proposed for addition to the NFTS. Alternative 3 has the lowest impacts on the three geo-indicators because it prohibits motorized cross-country travel and does not add any routes to the NFTS.

Compliance with the Forest Plan and Other Direction

Alternative 1 would not meet any of the geologic standards and guides. Landslide potential is not decreased with this alternative, which could lead to more sediment in the streams than under the action alternatives. Public health and safety would not be protected due to the abandoned mine access, elevated asbestos dust exposure risk and landslide rate.

Alternative 3 would meet all the geologic standards and guides. The prohibition of cross-country motorized travel would reduce the amount of sediment delivered to the streams. This would comply with the Aquatic Conservation Strategy objectives and protect water quality. The public health and safety would be enhanced by reducing abandoned mine access, and asbestos dust exposure risk. Geologic resources such as groundwater and unique geologic areas would also be protected.

Alternatives 2, 4, 5 and 6 would meet all of the standards and guides because they all prohibit cross-country travel, which is the most influential activity as far as geologic hazards and resources are concerned. The routes that would not be added to the NFTS would still affect the landscape but would begin to recover with time; effects to geological resources would be minimal. Alternative 4 has the least miles through unstable lands or ultramafic rock, followed by alternatives 6, 2 and 5.

3.20 Air Resources

3.20.1 Introduction

The Klamath National Forest (KNF) currently has no restrictions on off-highway vehicle (OHV) use on nearly 70 percent of the Forest. This unrestricted use is not consistent with the Travel Management Rule, CFR Part 212, Subpart B. Limiting OHV use to National Forest Transportation System (NFTS) roads and prohibiting motorized cross-country travel is needed to protect resources and meet the regulatory standards. This creates a need to provide motorized access to dispersed recreation opportunities as well as a variety of motorized recreation opportunities that currently may not be accessed by NFTS roads. This will require limited changes to the Klamath National Forest Transportation System. This report evaluates how air resources will be affected by the Motorized Travel Management project on the Klamath National Forest. This document discusses the existing air quality conditions and the potential impacts of the project.

3.20.2 Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Federal Laws Relevant to Travel Management Projects

Federal Clean Air Act (CAA) is the federal law passed in 1970, and last amended in 1990, (42 U.S.C. §7401 et seq.) which is the basis for national control of air pollution.

Regional Haze Rule (1990 Clean Air Act Amendments), 40 CFR Part 51.: The Regional Haze Rule requires states to demonstrate "reasonable progress" toward improving visibility in each class I area over a sixty-year period (to 2064), during which visibility should be returned to natural conditions. Class I areas include wilderness or national parks greater than 5,000 acres, which existed on August 7, 1977.

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. Environmental Protection Agency (EPA) passed the final General Conformity rule in 1993. Under the rule, Federal agencies must work with State and local governments in a nonattainment or maintenance area to ensure that federal actions conform to the initiatives established in the applicable state implementation plan (U.S. EPA 2008).

State Laws Relevant to Travel Management Projects

California Clean Air Act (H&S §§ 39660 et seq.): California adopted the California Clean Air Act (CCAA) 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 2007).

California Air Resource Board Off-Road Recreational Vehicle Emissions Standards Rulemaking (California code of regulations § 2410-2415): In 1994, the California Air Resource Board

(CARB) approved new off-highway recreational vehicle regulations (since amended in 1998). The rulemaking established emission standards for off-highway vehicles (OHVs) including off-road motorcycles (dirt bikes) and all-terrain vehicles (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.

3.20.3 Effects Analysis Methodology

Ozone is formed when hydrocarbons, released during the combustion of fossil fuels, react with nitrates in the presence of solar radiation. Ozone is a component of smog and is a common in areas with stagnant air such as valleys between mountain ranges. Ozone can result in chronic health effects if exposure to high levels is prolonged. Fine particle matter (PM2.5) can aggravate respiratory illnesses such as asthma and heart disease. Dust generated from motorized travel on unpaved routes and ground surfaces can contain a PM2.5 component. Changes to the current travel system on the Forest may change the concentration or the focus of these contaminants.

3.20.4 Affected Environment/Environmental Consequences

Affected Environment

The Klamath National Forest, located in the Northeast Plateau Air Basin, is comprised of three districts – (1) the Siskiyou County Air Pollution Control District (APCD), (2) the Modoc County APCD, and (3) the Lassen County APCS. The Forest is regulated by the Siskiyou County APCD. The National Ambient Air Quality Standards (NAAQS) were established by the Environmental Protection Agency for outdoor air, and are meant to protect public health and the environment from contaminants. The entire Northeast Plateau Air Basin is classified as in attainment for NAAQS. In order for an air basin to reach NAAQS attainment status the 8-hour ozone must be less than 0.075 parts per million (ppm) (annual mean) and the fine particle matter (PM2.5) must be less than 35.0 micrograms per cubic meter ($\mu g/m^3$) (annual mean). The most recent annual data (2006) show that the Siskiyou County APCD is in attainment for ozone and PM2.5. In 2006, the 8-hour ozone annual mean was 0.064 ppm and the PM2.5 annual mean was 22.0 $\mu g/m^3$ (Cox 2008).

Environmental Consequences

Alternative 1 – No Action

The direct effects of cross-country motorized travel may increase the amount of bare soil due to damage to vegetation, thus creating more dust (and particulate matter), adversely impacting air quality. Continued motorized travel on native surface NFTS or unauthorized routes may degrade the air quality. Even with these activities currently happening in the Forest, the Northeastern Plateau Air Basin is in attainment with

the NAAQS for 8-hour ozone and fine particulate matter set by the Environmental Protection Agency. The no-action alternative is the status quo, thus there should be no adverse impacts to air quality.

Alternatives 2-6 (Action Alternatives)

Direct and Indirect Effects

Generally, the number of vehicle miles traveled annually by Forest users is not expected to change in any of the alternatives through prohibition of cross-country travel and redirection of motorized use onto a designated system of roads, trails, and areas. As a result, effects are anticipated to air quality. It is possible that where seasonal restrictions are put into place, there may be a reduction in dust and a consequent reduction in particulate matter. In the same way, a reduction in traffic would result in fewer vehicle emissions during the restricted season. Both of these changes would result in a slight benefit to air quality. Action alternatives propose adding routes to the NFTS; however, any air quality-related issues that result from these actions are offset by the benefits to air quality from reducing cross-country travel.

Cumulative Effects

No direct or indirect adverse effects are anticipated to air quality as a result of this project; subsequently there would be no cumulative effects.

Discussion

The following analysis led to a determination that no adverse effects to air quality would result from any of the action alternatives:

- None of the action alternatives propose routes, areas or terminal facilities that would result in a significant increase or change in concentration of use
- None of the alternatives propose routes located in federal (national) non-attainment areas for pm 2.5 and ozone 8-hour

Tailpipe emissions have been accounted for by CARB in the green/red sticker program suggesting that CARB has a program to regulate these emissions to achieve state implementation plan targets. No adverse change in attainment status is expected to occur as a result of any of the alternatives proposed in this project.

Chapter 4 - Preparers, Consultation, Distribution, Glossary, References, and Index

List of Preparers

Cheryl Beck	GIS Specialist, TEAMS
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Consultation

Federal Agencies

USDI Fish and Wildlife Service
USDI National Marine Fisheries Service

State Agencies

State Historic Preservation Office

County Agencies

Siskiyou County Board of Supervisors
Siskiyou County Natural Resources Department

Distribution of the Environmental Impact Statement

This DEIS has been distributed to the following government agencies and to those organizations and individuals who specifically requested a copy of the document.

Other parties on the project mailing list were provided with a summary document and/or notified that the full document is on the Forest website.

Federal Agencies

Advisory Council on Historic Preservation
Agriculture, U.S, Department of
Animal and Plant Health Inspection Service
Forest Service, Region 5
Forest Service, Washington Office,
National Agricultural Library
Natural Resources Conservation Service
Office of Civil Rights
Commerce, U.S. Department of
National Oceanic and Atmospheric Administration – Fisheries, Eureka Office
National Oceanic and Atmospheric Administration – Fisheries, Yreka Office
National Oceanic and Atmospheric Administration, Office of Policy and Strategic Planning
National Marine Fisheries Service, Habitat Conservationists Division, Southwest Region
Energy, U.S. Department of
Office of NEPA Policy and Compliance
Environmental Protection Agency
Office of Federal Activities
Region 9
Region 10
Federal Aviation Administration, Western-Pacific Region
Federal Highway Administration, Western Region
Homeland Security, U.S., Department of
U.S. Coast Guard
Interior, U.S, Department of
Office of Environmental Policy and Compliance
U.S. Fish and Wildlife Service, Yreka Office
U. S. Army Engineer Division, South Pacific

State Agencies

California Regional Water Quality Control Board, North Coast Region
California Department of Fish and Game
California Department of Forestry and Fire
Oregon Department of Fish and Wildlife

Local Government Agencies

Siskiyou County

Organizations and Individuals

George Sexton, Klamath Siskiyou Wildlands Center
Bob Musgrove, Sierra Club
Scott Greacen, EPIC
Rick Svilich, American Forest Resource Council
Kimberly Baker, Klamath Forest Alliance
Richard Nawa, Siskiyou Project
Doug Heiken, Oregon Wild
Trout Unlimited
Roy Hall Jr., Shasta Tribe, Inc.
Jim Bennett, Forks of Salmon Indian Council
Jim Lipke, Siskiyou County Off Road Riders
Stan VanVelsor, The Wilderness Society
Danielle Lindler, KARE
John Lyons, Backcountry Horsemen

Public Libraries

Siskiyou County Library, Yreka
Siskyou County Library, Mt. Shasta
Happy Camp Library
Etna City Library
Fort Jones Library

Federally Recognized Tribes

Karuk Tribe of California
The Klamath Tribes
Quartz Valley Indian Reservation
Pit River Tribe
Yurok Tribe
Hoopa Valley Tribe
Shasta Indian Nation
Confederated Tribes of Siletz Indians of Oregon
Confederated Tribes of Grand Ronde Community

Acronyms

4WD	4-Wheel Drive
ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
ATV	All-terrain Vehicle
BA	Biological Assessment
BE	Biological Evaluation
BMP	Best Management Practices
CAR	Critical Aquatic Refuge
CARB	California Air Resources Board
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CVC	California Vehicle Code
CWE	Cumulative Watershed Effects
CWHR	California Wildlife Habitat Relationships
DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement
EHR	Environmental Health Review
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERA	Equivalent Roaded Acres
ESA	Endangered Species Act of 1973
FR	Federal Register
FRTA	National Forest Roads and Trails Act
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSR	Forest Service Representative
FSS	Forest Service Sensitive
FTS	Forest Trail System
FY	Fiscal Year
GIS	Geographic Information System
HRCA	Home Range Core Area
HCS	Hydrologically Connected Segment
HFC	Hydrologic Function Class
HR	Heritage Resources
HSA	Hydrologically Sensitive Area
HUC	Hydrologic Unit Code
HWY	Highway

IDT	Interdisciplinary Team
IRA	Inventoried Roadless Area
LEI	Law Enforcement and Investigations
LEO	Law Enforcement Officer
MEHR	Maximum Erosion Hazard Rating
MI	Miles
MIS	Management Indicator Species
ML1	Maintenance Level 1 (closed to public motorized use)
ML2	Maintenance Level 2
ML3	Maintenance Level 3
ML4	Maintenance Level 4
ML5	Maintenance Level 5
MMU	Motorized-Mixed Use
MOI	Memorandum of Intent
MTM	Motorized Travel Management
MVUM	Motor Vehicle Use Map
NEPA	National Environmental Policy Act
NF	National Forest
NFMA	National Forest Management Act
NFS	National Forest System
NFTS	National Forest Transportation System
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NRA	Natural Research Area
NRHP	National Register of Historic Places
NVUM	National Visitor Use Monitoring
ORV	Off-Road Vehicle
OHV	Off-Highway Vehicle
PA	Programmatic Agreement
PAC	Protected Activity Center
R5	Region 5
RARE	Roadless Area Review and Evaluation
RCA	Riparian Conservation Area
RD	Ranger District
RMO	Road Management Objective
RNA	Research Natural Area
RO	Regional Office
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
SHPO	State Historic Preservation Office
SIA	Special Interest Area

S&G	Standard and Guideline
SOPA	Schedule of Proposed Actions
SUV	Sports Utility Vehicle
TCP	Traditional Cultural Property
TE	Threatened and Endangered
TES	Threatened, Endangered and Sensitive
TM	Travel Management Rule
TMO	Trail Management Objective
TOC	Threshold of Concern
USC	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VQO	Visual Quality Objective
WSR	Wild and Scenic River

Glossary

Administrative Unit - A National Forest or National Grassland.

All-Terrain Vehicle - Any motorized, off-highway vehicle 50 inches or less in width, having a dry weight of 600 pounds or less that travels on three or more low-pressure tires with a seat designed to be straddled by the operator. Low pressure tires are 6 inches or more in width and designed for use on wheel-rim diameters of 12 inches or less using an operating pressure of 10 pounds per square inch (psi) or less per vehicle-manufacturer recommendations.

Area - A separate specifically delineated space smaller than a Ranger District.

Deferred Maintenance - Maintenance not performed when scheduled and delayed for the future.

Designated Road, Trail, or Area - A National Forest System road, a National Forest System trail, or an area on National Forest System lands designated for motor vehicle use and displayed on a Motor Vehicle Use Map (MVUM).

Forest Development Road - A forest road under U.S. Forest Service jurisdiction.

Forest Development Trail - A forest trail under U.S. Forest Service jurisdiction.

Forest Highway - A forest road under jurisdiction of and maintained by a public authority and open to public travel.

Forest Road or Trail - A road or trail wholly or partly within or adjacent to and serving the National Forest System that the U.S. Forest Service deems necessary for protection, administration, and use for the National Forest System and the use and development of its resources.

Forest Transportation Atlas - A display of an administrative system's roads, trails, and airfields.

Forest Transportation Facility - A forest road or trail or an airfield that is displayed in a forest transportation atlas, including bridges, culverts, parking lots, marine access facilities, safety devices, and other improvements appurtenant to the forest transportation system.

Forest Transportation System - The system of National Forest System roads, National Forest System Trails, and airfields on National Forest System lands.

Four-Wheeled Drive Way - A National Forest System road included in the Forest Transportation Atlas and commonly used by four-wheel drive, high clearance vehicles with a width greater than 50 inches unless designated and managed as a trail.

Jurisdiction - The legal right to control and regulate the use of a transportation facility. Roads on National Forest System lands are under the control of the U.S. Forest Service except for public roads established under the Act of July 26, 1866; private roads; roads for which the U.S. Forest Service has granted rights-of-way to private landowners or public road agencies; and roads whose use and rights pre-date the National Forest.

Maintenance Levels - The level of service provided by and maintenance required for a specific road, consistent with road management objectives and maintenance criteria.

Maintenance Level 1 - Assigned to intermittent service roads when they are closed to vehicular traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. While being maintained at level 1, roads are closed to vehicular traffic but may be open and suitable for non-motorized uses.

Maintenance Level 2 - Assigned to roads open for use by high-clearance vehicles. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level.)

Maintenance Level 3 - Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material.

Maintenance Level 4 - Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. Roads may be paved and/or dust abated.

Maintenance Level 5 - Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double-lane, paved facilities. Some may be aggregate surfaced and dust abated.

Motor Vehicle - Any self-propelled vehicle other than a vehicle operated on rails or any wheelchair or mobility device, including battery-powered chairs, designed solely for use by a mobility-impaired person for locomotion and suitable for use in an indoor pedestrian area.

Motor Vehicle Use Map (MVUM) - A map reflecting designated roads, trails, and areas on a National Forest System administrative unit or Ranger District.

National Environmental Policy Act (NEPA) Procedures - The rules, policies, and procedures governing agency compliance with the National Environmental Policy Act.

National Forest System - As defined in the Forest Rangeland Renewable Resources Planning Act, the “National Forest System'” includes all National Forest lands reserved or withdrawn from the public domain of the United States, all National Forest lands acquired through purchase, exchange, donation, or other means; the National Grasslands and land use projects administered under Title III of the Bankhead-Jones Farm Tennant Act (50 Stat. 525, 7 U.S.C. 1010- 1012); and other lands, waters, or interests therein administered by the U.S. Forest Service or are designated for administration through the U.S. Forest Service as part of the system.

National Forest System Land - All Forest Service-administered lands, waters, or interests therein.

National Forest System Road - A forest road other than a road that has been authorized by a legally documented right-of-way held by a state, county, or other local public road authority.

National Forest System Trail - A forest trail other than a trail that has been authorized by a legally documented right-of-way held by a state, county, or other local public road authority.

National Recreation Trail - A trail that provides a variety of outdoor recreation uses in, or reasonably accessible to, urban areas.

Off-Highway Vehicle (OHV) - Any motorized vehicle designed for or capable of cross-county travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.

Off-Road Vehicle - Synonymous with off-highway vehicle (OHV).

Over-Snow Vehicle - A motor vehicle designed for use over snow that runs on a track or tracks and/or a ski or skis while in use over snow.

Passenger Cars - Vehicles that are passenger cars of all sizes; sport/utility vehicles; minivans; vans; and pickup trucks.

Public Road - Any road or street under the jurisdiction of and maintained by a public authority and open to public travel.

Right-of-Way - A privilege or right to cross over or use the land of another party for egress and ingress such as roads, pipelines, irrigation canals, or ditches. The right-of-way may be conveyed by an easement, permit, license, or other instrument.

Road - A motor vehicle route over 50 inches wide, unless identified and managed as a trail.

Road Construction or Reconstruction - Supervising, inspecting, actual building, and incurrence of all costs incidental to the construction or reconstruction of a road.

Road Decommissioning - Activities that result in stabilizing and restoring unneeded roads to a more natural state.

Road Management Objectives - The intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria.

Special Use Authorization - A permit, term permit, lease, or easement that allows occupancy, use, rights, or privileges of National Forest System land.

Temporary Road or Trail - A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or trail and that is not included in a Forest Transportation Atlas.

Trail - A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail.

Trail Vehicle - A vehicle designed for trail use, such as bicycles, snowmobiles, trail bikes, trail scooters, and all-terrain vehicles.

Travel Management Atlas - An atlas that consists of a Forest Transportation Atlas and a Motor Vehicle Use Map (MVUM) or Maps.

Unauthorized Road or Trail - A road or trail that is not a forest road or trail or a temporary road or trail and is not included in a Forest Transportation Atlas.

Wheelchair - A device designated solely for use by a mobility impaired person for locomotion and suitable for use in an indoor pedestrian area.

References Cited

References are sorted by resource area.

Recreation Resources

Martin, Stephen A., Anthony Leung, Patrick Pallini. 2005. California Off-Highway Vehicle Noise Study: A Report to the California Legislature as Required by Public Resources Code Section 5090.32 (0) Prepared for: State of California Department of Parks and Recreation Off-Highway Motor Vehicle Recreation Division. Wyle Laboratories.

Ouren, Douglas S., Christopher Haas, Cynthia P. Melcher, Susan C. Stewart, Phadrea D. Ponds, Natalie R. Sexton, Lucy Burris, Tammy Fancher, and Zachary H. Bowen. 2007. Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands: A Literature Synthesis, Annotated bibliographies, Extensive Bibliographies and Internet Resources. US Department of the Interior and U.S. Geological Survey.

Turina, Frank, Ericka Pilcher. 2006. Protecting Natural Sounds in National Parks: Soundscape Workshop Visitor Experience and Soundscapes Annotated Bibliography March 1-2. National Park Service and Colorado State University.

USDA Forest Service. 1982. 1982 ROS Users Guide.

USDA Forest Service. 1995. Land and Resource Management Plan. Klamath National Forest, Yreka California.

USDA Forest Service. 2001. National Visitor Use Monitoring Data. Klamath National Forest, Yreka California.

Hydrological Resources

Beschta, R.L., M.R. Pyle, A.E. Skaugset, and C.G. Surfleet. 2000. Peak flow response to forest guidelines in the western cascades of Oregon, USA. Journal of Hydrology 233, pages 102-120.

Bilby, R.E., K. Sullivan, and S.H. Duncan. 1989. The generation and fate of road-surface sediment in forested watersheds in southwestern Washington. Forest Science. 35(2) pages 453-468.

Foltz, R.B. 2006. Erosion from all terrain vehicle (ATV) trails on national forest lands. American Society of Agricultural and Biological Engineers. Paper number 068012.

Forsyth, A.R., K.A. Bubb, and M.E. Cox. 2006. Runoff, sediment loss and water quality from forest roads in a southeast Queensland coastal plain pinus plantation. Forest Ecology and Management 221 pages 194-206.

Grant, G.E., S.L. Lewis, F.J. Swanson, J.H. Cissel, and J.J. McDonnell. 2008. Effects of forest practices on peak flows and consequent channel response: a state-of-science report for western Oregon and Washington. USDA Forest Service General Technical Report PNW-GTR-760. 76 pages.

Jones, J.A., and G.E. Grant. 1996. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research, 32(4), pages 959-974.

Jones, J.A. 2000. Hydrologic processes and peak discharge response to forest removal, regrowth and roads in 10 small experimental basins, western Cascades, Oregon. Water Resource Research 36(9), pages 2621-2642.

Laurent, T. personal communication, February, 2009. Soil Scientist, Klamath National Forest.

Luce, C.H. and T.A. Black. 1999. Sediment production from forest roads in western Oregon. Water Resources Research 35(8) pages 2561-2570.

Reid, L.M. and T. Dunne. 1984. Sediment production from forest road surfaces. Water Resources Research. 20(11) pages 1753-1761.

Sheridan, G.J. P.J. Nose, R.K. Whip, and N. Wijesinghe. 2006. The effect of truck traffic and road water content on sediment delivery from unpaved forest roads.

State of California 2006a. Proposed 2006 CWA section 303(d) list of water quality limited segments.

State of California 2006b. Fact sheets supporting the revision of the section 303(d) list. California Water Quality Control Boards.

Thomas, R.B., and W.F. Megahan. 1998. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon: a second opinion. Water Resources Research. 34 (12) pages 3393-3403.

USDA Forest Service. 1995. Land Management and Resource Plan. Klamath National Forest. Yreka, California.

USDA Forest Service. 2000. Water quality management for forest system lands in California; best management practices. Pacific Southwest Region. 137 pages.

Wemple, B.C., J.A. Jones, and G.E. Grant. 1996. Channel network extension by logging roads in two basins, western cascades, Oregon.

Wemple, B.C. and J.A. Jones. 2003. Runoff production on forest roads in a steep mountain catchment. Water Resources Research 39(8).

Wright, K.A., K.H. Sendek, R.M. Rice, and R.B. Thomas. 1990. Logging effects on stream flow: storm runoff at Caspar Creek in Northwestern California. Water Resources Research 26(7) pages 1657-1667.

Zeimer, R.R. 1998. Flooding and stormflows. USDA Forest Service General Technical Report PSW-GTR_168, pages 15-24

Soil Resources

Bilby, R.E., K. Sullivan, and S.H. Duncan. 1989. The generation and fate of road-surface sediment in forested watersheds in southwestern Washington. Forest Science. 35(2) pages 453-468.

Foltz, R.B. 2006. Erosion from all terrain vehicle (atv) trails on national forest lands. American Society of Agricultural and Biological Engineers. Paper number 068012.

Forsyth, A.R., K.A. Bubb, and M.E. Cox. 2006. Runoff, sediment loss and water quality from forest roads in a southeast Queensland coastal plain pinus plantation. Forest Ecology and Management 221 pages 194-206.

Laurent, T. February 2009. Personal communication. Soil scientist, Klamath National Forest.

Reid, L.M, and T. Dunne. 1984. Sediment production from Forest road surfaces. Water Resource Research 20(11), pages 1753-1761.

Sheridan, G.J. P.J. Nose, R.K. Whip, and N. Wijesinghe. 2006. The effect of truck traffic and road water content on sediment delivery from unpaved forest roads.

USDA Forest Service. 1990. Soil and Water Conservation Handbook. R5 Amendment 7/16/90, Chapter 50, Soil Erosion Hazard Rating.

USDA Forest Service. 1991. Soil Management Handbook. WO Amendment 2509.18-91-1.

USDA Forest Service. 1995. Soil Management Handbook, R5 Supplement No. 2509.18-95-1.

Aquatic Biota

Barnhart, R.A. 1986. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)--steelhead. U.S. Fish and Wildl. Serv. Biol. Rep. 82(11.60). 21 pages.

Bell, M.C. 1986. Fisheries Handbook of Engineering Requirements and Biological Criteria. US Army Corp of Engineers, Office of the Chief of Engineers, Fish Passage Development and Evaluation Program, Portland, Oregon.

Broderson, J. M. 1973. Sizing buffer strips to maintain water quality. M.S. Thesis, University of Washington, Seattle, WA.

Burgner, R.L., J.T. Light, L. Margolis, T. Okazaki, A. Tautz, and S. Ito. 1992. Distribution and origins of steelhead trout (Oncorhynchus mykiss) in offshore waters of the North Pacific Ocean. Int. North Pac. Fish Comm. Bull. 51. 92 pages. In Busby et al. (1996).

Busby, P. J., Wainwright, T. C., Bryant, G. J., Lierheimer, L. J., Waples, R. S., Waknitz, F. W., and Lagomarsino, I. V. 1996. Status review for Klamath Mountains Province steelhead. NOAA technical memorandum NMFS-NWFSC-19.

Cedarholm, CJ; LM Reid, EO Salo. 1980. Cumulative Effects of Logging Road Sediment on Salmonid Populations in the Clearwater River, Jefferson County, Washington. Contribution No. 543, College of Fisheries, University of Washington, Seattle, Washington 98195. 35pp.

Cederholm, C.J., L.M. Reid, and E.O. Salo. 1981. Cumulative effects of logging road sediment on Salmonid populations in the Clearwater River, Jefferson County, Washington. In: Proceedings from Salmon Spawning Gravel: A Renewable Resource in the Pacific Northwest p. 38-74. Report 39. State of Washington Water Research Center, Pullman.

Chin, A., Rohrer, DM, Marion, DA and Clingenpeel, JA. 2004. Ouachita and Ozark Mountains symposium: ecosystem management research. Gen. Tech. Rep. SRS-74. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station, 321 p.

Christensen, E.R., A. Li, I.A. Ab Razak, P. Rachdawong and J.F. Karls, Sources of polycyclic aromatic hydrocarbons in sediments of the Kinnickinnic River, Wisconsin. J Great Lakes Res 23 1 (1997), pp. 61–73.

Clinton, B. D.; Vose, J. M. 2003. Differences in Surface Water Quality Draining Four Road Surface Types in the Southern Appalachians. Southern Journal of Applied Forestry, Vol. 27, No. 2, May 2003. p. 100-106.

Fleming, I.A., and M.R. Gross. 1993 . Breeding success of hatchery and wild coho salmon (Oncorhynchus kisutch) in competition. Ecol. Appl. 3(2): 230–245.

Gaines, W.L., P.H. Singleton, and R.C. Ross. 2003. Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests. Gen. Tech. Rep. PNW-GTR-586. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 79p.http://www.fs.fed.us/pnw/pubs/gtr586.pdf

Good, T. P., R. S. Waples, P. Adams. (eds.) 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-66, 598 p.

Gucinski, H.; MJ Furniss; RRs Ziener; MH Brookes. 2001. Forest Roads: A Synthesis of Scientific Information. U.S. Dept. Agriculture, Forest Service. General Technical Report. PNW-GTR- 509. pp103. 2001.

Hassler, T.J. 1987. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)--coho salmon. U.S. Fish and Wildl. Serv. Biol. Rep. 82(11.70). 19 pages

Healey, M.C. 1991. The life history of Chinook salmon (Oncorhynchus tshawytscha). Pages 213-393 In: C. Groot and L. Margolis (eds.), Life history of Pacific salmon. Univ. B.C. Press, Vancouver, B.C.

Jennings, M.R.1996. Status of Amphibians. Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II, Assessments and Scientific Basis for Management Options. Davis: University of California, Centers for Water and Wildland Resources.

Meehan, William R. Editor. 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19. U.S. Department of Agriculture. Forest Service.

Meyers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grand, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998.

Moyle P. B. and P. J. Randall. 1996. Biotic Integrity of Watersheds. In Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, chap 34. Davis: University of California, Centers for Water and Wildland Resources.

Moyle, P.B. and P.J. Randall. 1996. Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II, Assessment and Scientific Basin for Management Options. Univ. of Calif. Davis, Centers for Water and Wildland Resources.

Moyle, P.B., R.M. Yoshiyama, J.E. Williams, and E. Wikramanayake. 1996. Fish Species of Special Concern in California. Sacramento, California. Department of Fish and Game.

Nickelson, T.E., J.W. Nicholas, A.M. McGie, R.B. Lindsay, D.L. Bottom, R.J. Kaiser, and S.E. Jacobs. 1992. Status of anadromous salmonids in Oregon coastal basins. Unpublished.

Nielsen, J.L. 1994 . Invasive cohorts: impacts of hatchery-reared coho salmon on the trophic, developmental, and genetic ecology of wild stocks. Pp. 361–385 in Theory and Application in Fish Feeding Ecology, D.J. Stouder, K.L. Fresh, and R.J. Feller, eds. Columbia : University of South Carolina Press.

NRC (National Research Council). 1996 . Upstream: Salmon and Society in the Pacific Northwest. Washington, DC : National Academy Press.

Ouren, D.S., C. Haas, C.P. Melcher, S.C. Stewart, P.D. Ponds, N.R. Sexton, L. Burris, T. Fancher, and Z.H. Bowen. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353, 225 p. http://www.fort.usgs.gov/products/publications/22021/22021.pdf

Reeves, G.H., F.H. Everest, and J.D. Hall. 1987. Interactions between the redside shiner (*Richardsonius balteatus*) and the steelhead trout (*Salmo gairdneri*) in western Oregon: the influence of water temperature. Can. J. Fish. Aquat. Sci. 44:1603-1613.

Rich, A.A. 1997. Testimony of Alice A. Rich, Ph.D., regarding water rights applications for the Delta Wetlands Project, proposed by Delta Wetlands Properties for Water Storage on Webb Tract, Bacon Island, Bouldin Island, and Holland Tract in Contra Costa and San Joaquin Counties. July. Calif. Dept. of Fish and Game Exhibit DFG-7. Submitted to State Water Resources Control Board.

Sandercock, F.K. 1991. Life history of coho salmon. Pages 397-445 *In* C. Groot and L. Margolis (eds.), Pacific salmon life histories. Univ. British Columbia Press, Vancouver. 564 pages.

Sigler, J.W., T.C. Bjornn and F.H. Everest. 1984. Effects of Chronic Turbidity on Density of Steelheads and Coho Salmon. Transactions of the American Fisheries Society, 113: 142-150

Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-35, 443 p.

Seymour, A.H. 1956. Effects of temperature on young Chinook salmon. Ph.D. thesis. University of Washington, Seattle, WA.

Trombulak, S.C., and C.A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1):p 18-30.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. U.S. Dep. Commer., NOAA Tech Memo. NMFS-NWFSC-24, Northwest Fisheries Science Center, Seattle, Washington. 258 pages.

USDA Forest Service (USFS), 1994a, Land and Resource Management Plan – Klamath National Forest: USDA Forest Service, Klamath National Forest, Yreka, CA.

USDA Forest Service. 1995. Record of Decision for the Final Environmental Impacts Statement for the Klamath National Forest and Land and Resource Management Plan. Klamath National Forest. (LRMP)

USDA Forest Service (USFS), 1995, Klamath National Forest Final Land and Resource Management Plan: USDA Forest Service, Klamath National Forest, Yreka, CA.

USDA Forest Service (USFS), 1998a, Cumulative Watershed Effects from Three Models Applied to 249 Seventh-field Watersheds on the Westside of the Klamath National Forest: Don Elder (author), unpublished, USDA Forest Service, Klamath National Forest, Yreka, CA.

USDA Forest Service. 2000. Forest Service Roadless Area Conservation Final Environmental Impact Statement Biological Evaluation for Threatened, Endangered and Proposed Species and Sensitive Species. Written by Seona Brown and Ron Archuleta and signed on 11/13/2000. Unpublished. 90 pages.

USDA Forest Service. 2003. Best Management Practices Report. Klamath National Forest. http://www.fs.fed.us/r5/klamath/projects/forestmanagement/forestplan/reports/resourceplanreports/2003bmpfinalreport.pdf

USDA Forest Service. 2001a. Forest Roads: A synthesis of scientific information. Pacific Northwest Research Station General Technical Report PNW-GTR-509. 103p.

USDA Forest Service. 2004. Forestwide Facility Maintenance and Watershed Restoration Biological Assessment/Evaluation for the Klamath National Forest. 76 pages.

USDC National Marine Fisheries Service (NMFS or NOAA-Fisheries). 2001. Water-Drafting Specifications

U.S. Department of the Interior, Fish and Wildlife Service (USDI Fish and Wildlife Service). 2005. Endangered and Threatened Species: Final Listing Determinations for ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. FR(1670): 37160

U.S. Department of the Interior, Fish and Wildlife Service. 1997. Final Rule: Threatened Status for Southern Oregon/Northern California Coast Evolutionarily Significant Unit (ESU) of Coho Salmon. FR(62): 24588.

Terrestrial Wildlife

Allison, Bonnie L.; Creasy, R. Max; Ford, K. Mike; Hacking, Anthony; Shaefer, Robert; West, John R.; and Youngblood, Quentin. 2007. Elk Management Strategy, Klamath National Forest. 41 pp.

Anderson, Richard L.; Dinsdale, Julie L.; and Schlorff, Ronald. 2007. UC Davis Wildlife Health Center. California Department of Fish and Game Resource Assessment Program Final Report P0485902. 7 pp. Available http://www.dfg.ca.gov/rap/projects/swainsonhawk [2009, April 6].

Anthony, Robert.G.; Knight, R.L.; Allen, G.T.; McClelland, B.R.; and J.I. Hodges, J.I 1982. Habitat Use by Nesting and Roosting Bald Eagles in the Pacific Northwest. Trans. N. Am. Wildlife Natural Resources Conference. 68pp.

Anthony, Robert G.; Steidl, Robert J.; and McGarigal, Kevin 1995. Recreation and bald eagles in the Pacific Northwest. In: Knight, R.L.; Gutzwiller, K.J., eds. Wildlife and recreationists: coexistence through management and research. Washington, DC: Island Press: 223–241. (as cited in Gaines et al. 2003).

Benkobi, Lakhdar; Rumble, Mary A.; Brundige, Gary C.; and Millspaugh, Joshua J. 2004. Refinement of the Arc-Habcap model to predict habitat effectiveness for elk. USDA Forest Service. Rocky Mountain Research Station. RMRS-RP-51. 18pp.

Blessing, Dan. 2009. [Personal communication]. March 17. Klamath National Forest, Yreka, California.

Branson, B.A. 1980. Collections of gastropods from the Cascade Mountains of Washington. The Veliger, 23(2): 171-176.

Brown, Jeff. 2009. [Personal communication]. March 24. Klamath National Forest, Yreka, California.

Buehler, David A.; Mersmann, Timothy J.; Fraser, James D.; Seegar, J.K.D. 1991. Non-breeding bald eagle communal and solitary roosting behavior and roost habitat on the northern Chesapeake Bay. Journal of Wildlife Management. 55: 273–281. Abstract.

Bull, E.L. and R.S. Holthausen. 1993. Habitat use and management of pileated woodpeckers in northeastern Oregon. J. Wildl. Manage. 57(2):335-345

Bull, E.L. R.S. Holthausen, and M.G. Henjum. 1992. Roost trees used by pileated woodpeckers in northeastern Oregon. J. Wildl. Manage. 56(4): 786-793.

Bull, Evelyn L., and Charles T. Collins. February 2007. Vaux's Swift. Birds of North America [online]. Cornell Lab of Ornitholgy. http://bna.birds.cornell.edu/bna. [2009, March 23].

Burke, T. E.; Duncan, Nancy; and Jeske, N. 2000. Management recommendations for terrestrial mollusk species. Regional Interagency Executive Committee Survey and Manage Work Group.

Bury, R. B. 1983. Differences in amphibian populations in logged and old-growth redwood forest. Northwest. Sci. 57:167-178. (as cited in CDFG 1990)

Bury, R. B., and P. S. Corn. 1988. Douglas-fir forests in the Oregon and Washington Cascades: relation of the herpetofauna to stand age and moisture. Pages 11-22 in R. C. Szaro, K. E. Severson, and D. R. Patton, tech. coords. Proceedings of the symposium on the management of amphibians, reptiles, and small mammals in North America. U.S.D.A. Forest Service, Gen. Tech. Rept. RM-166. (as cited in CDFG 1990)

Buskirk, Steven W., and Ruggiero, Leonard F. 1994. American marten. In: Ruggiero, Leonard F.; Aubry, Kieth. B.; Buskirk, Steven W.; Lyon, L. Jack.; Zielinski, William J., tech. eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. RM-254. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. pp. 7–37.

Buskirk, Steven W.; and Zeilinski, William. 2003. Mammal Community Dynamics. Zabel, C.J.; and Anthony, Robert G., eds. Cambridge University Press.

California Department of Fish and Game. 1990. California's Wildlife. Zeiner, D.C., ed. http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx [March 24, 2009]

California Department of Fish and Game. 2005. Petition to the State of California Fish and Game Commission supporting information for Siskiyou Mountains Salamander (Plethodon stormi). California Department of Fish and Game, Sacramento, CA.

California Department of Fish and Game. 2006. Sierra Nevada Red Fox Web Site. Interior Timberland Planning. Habitat Conservation Program, Northern Region. Redding, California. https://r1.dfg.ca.gov/Portal/Wildlife/WildlifeSpecies/SierraNevadaRedFox/tabid/618/Default.aspx [2009 March 16] .

California Department of Fish and Game. 2008. Sandhill Crane Web Site. (Update March 26, 2009) Interior Timberland Planning, Habitat Conservation Program, Northern Region. Redding, California. https://r1.dfg.ca.gov/portal/itp/WildlifeSpecies/SandhillCranel/tabid/621/Default.aspx [2009, April 13].

California Department of State Parks and Recreation. 2002. Taking the high road: the future of California's off-highway vehicle recreation program. California Department of State Parks and Recreation, Sacramento, California.

Canfield, Jodie E.; Lyon, L.Jack .; Hillis, J.Michael; and Thompson, Michael J. 1999. Ungulates. In: Joslin,G.; Youmans, H., coords. Effects of recreation on Rocky Mountain wildlife: a review for Montana. Helena, MT: Committee on Effects of Recreation on Wildlife, Montana (as cited in Gaines 2003)

Cheyne, Christy. 2009. [Personal communication]. March 3. Klamath National Forest, Yreka, California

Claar, James J., Anderson, Niel; Boyd, Diane; Conard, Ben; Hickman, Gene; Hompesch, Robin; Olson, Gary; Ihsle Pac, Helga; Wittinger, Tom; and Youmans, Heidi. 1999. Carnivores. in G. Joslin and H. Youmans, coordinators. Effects of recreation on Rocky Mountain Wildlife: a Review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of the Wildlife Society. 307 pp.

Clayton, David. R.; Ollivier, Lisa. M.; and Welsh, Hart H. 1999. Survey protocol for the Siskiyou Mountains salamander (Plethodon stormi) version 3.0.

Clayton. David. R.; Olson, Deanna H.; and Nauman, Richard. S. 2004. Conservation assessment for the Siskiyou Mountains salamander (Plethodon stormi). U.S.Department of Interior, Fish and Wildlife Service and USDA, Forest Service. Unpublished report.

Clayton, David, and Nauman, Richard. 2005. Siskiyou Mountains salamander, in Amphibians of the Pacific Northwest. Seattle Audobon Society, Seattle, WA.

Clark, T. W., E. Anderson, C. Douglas, and M. Strickland. 1987. Martes americana. Mammal. Species No. 289. 8pp. (As cited in CDFG 1990).

Corkran, C. and C. Thoms. 1996. Amphibians of Oregon, Washington and British Columbia. Lone Pine Publishing.

Creasy, Max 2009. [Personal communication]. April 20. Klamath National Forest, Yreka, California.

Delaney, David K., Grubb, Teryl G.; and Pater, Larry L. 1997. Effects of Helicopter Noise on Nesting Mexican Spotted Owls. A Report to U.S. Air Force 49 CES/CEV Holloman Air Force Base, Project Order No. CE P. O. 95-4.

Delaney, David. K.; Grubb, Teryl G.; Beier, Paul; Pater, Larry L.; and Reiser, M. Hildegard. 1999. Effects of Helicopter Noise on Mexican Spotted Owls. Journal of Wildlife Management. 63(1) 60-76.

Davis, Jim. 2009. [Personal communication]. March 17. Klamath National Forest, Yreka, California.

Duncan, Nancy., Burke, Timothy; Dowlan, S. and Hohenlohe, P. 2003. Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan. Unpublished report. 70 pp. Transmitted to the field February 21, 2003.

Farber, Stewart., and Franklin, Tom. 2005. Presence-absence surveys for pacific fisher (Martes pennanti) in the eastern Klamath Province of interior northern California. Unpublished data. Timber Products Company.

Farber, Stewart, and Criss, Steven. 2006. Cooperative mesocarnivore surveys for the upper and west fork of Beaver Creek watersheds in interior northern California. Unpublished data. Timber Products and Criss & Company Consultants.

Feder, M. E. 1983. Integrating the ecology and physiology of Plethodontoid salamanders. Herpetologica. 39:219-310.

Figura, Peter. 2009. [Email communication]. March 16. California Department of Fish and Game, Redding, California.

Finley, Laura. [Personal communication]. May 6, 2009. U.S. Fish and Wildlife Service, Yreka, California.

Fuller, D. D. and A. J. Lind. 1992. Implications of fish habitat improvement structures for other stream vertebrates. In R. Harris and D. Erman (eds.), Proceedings of the Symposium on Biodiversity of Northwestern California, pp 96-104. Santa Rosa, California.

Gaines, William L.; Singleton, Peter H., and Ross, Roger C. 2003. Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests. GTR-586. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Goldstein, Michael. I.;Woodbridge, Brian; Zaccagnini, Maria E. and Canavelli, Sonia B. 1997. An assessment of mortality of Swainson's hawks on wintering grounds in Argentina.J. Raptor Res. 30:106-107.

Graham, Elaina. 2009. [Personal communication]. March 16. Klamath National Forest, Yreka, California.

Grinnell, John.; Dixon, J. S.; and Linsdale. J. M. 1937. Fur-bearing mammals of California. 2 Vols. Univ. California Press, Berkeley. 777pp. (as cited in CDFG 1990)

Gucinski, Hermann, Furniss, Michael J., Ziemer, Robert R., and Brookes, Martha H. 2001. Forest roads: A synthesis of scientific information. GTR-509. Portland, OR: U.S. Department of Agriculture, Forest

Hamann, Betsy; Johnston, Heather; Gobielle, John; Hillis, Mike; Johnson, Sara; Kelly, Lynn; and McClelland, Pat. 1999. Birds. In: Joslin, G.;Youmans, H., coords. Effects of recreation on Rocky Mountain wildlife: a review for Montana. Helena, MT: Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society: 3.1–3.34. (as cited in Gaines et al. 2003)

Hillis, Mike; Pengeroth, Denise, and Leach, Rose. 2003. Potential changes in large diameter snag densities, snag recruitment opportunities, and impacts on snag-dependant species in Region 1. Unpublished paper. U.S. Department of Agriculture, Forest Service. http://www.fs.fed.us/r1/cohesive_strategy/integration/wildlife/R1_PIWO_assessment2.htm [2009, March 16].

Hillis, Mike; Jacobs, Amy, Wright, Vita. Undated. Black-backed Woodpecker Assessment. Undated. U.S. Department of Agriculture, Forest Service. Region One. http://www.fs.fed.us/r1/cohesive_strategy/integration/wildlife/bbwp.html. [2009, March 16].

Ingles, L. G. 1965. Mammals of the Pacific states. Stanford Univ. Press, Stanford, CA. 506pp. (cited in CDFG 1990).

Isbell, Clint. 2009. [Email communication]. March 19. Forestwide fire severity data. Klamath National Forest.

Jennings, M.R. and M.P. Hayes. 1988. Natural history and decline of native ranids in California. Pp. 61-72 in Proceedings of the Conference on California Herpetology. Eds. H.P. DeLisle, P.R. Brown, B. Kaufman, and B.M.McGurty.

Johnson, Dave. 2009. [Personal communication]. March 19. U.S. Fish and Wildlife Service, Yreka, California.

Johnson, Jan. U.S. Forest Service Biologist. Personal observation.

Jurek, R.M. 1988. Five-year status report. Bald Eagle. California Dept. Fish and Game. Sacramento, California. 15pp.

Juntti, Thomas M.; Rumble, Mark A. 2006. Arc habitat suitability index computer software. General Technical Report RMRS GTR 180WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 31 p.

Knight, R.L.; Gutzwiller, K.J., eds. 1995. Wildlife and recreationists: coexistence through management and research. Washington, DC: Island Press. 372 p. (as cited in Gaines et al. 2003).

Klamath National Forest 2002. Threatened, Endangered, and Sensitive Species Reference Document. Updated in 2007 and 2008.

Lehman, Robert N. 1979. A survey of selected habitat features of 95 Bald Eagle nests in California. Calif. Dept. Fish and Game. Wildl. Manage. Branch Admin. Rep. 79-1, Sacramento, CA 23pp.

Mannan, R. W. 1977. Use of snags by birds, Douglas fir region, western Oregon. Master's Thesis. Oregon.State Univ. Corvallis, OR. (cited in Walters et al. 2002)

Marra, Peter P. and Holberton, Rebecca.L. 1998. Corticosterone levels as indicators of habitat quality: effects of habitat segregation in a migratory bird during the non-breeding season. Oecologia. 116: 284–292.

McCaskie, G., P. DeBenedictis, R. Erickson, and J. Morlan. 1988. Birds of Northern California, an Annotated List. Second Edition. Golden Gate Audubon Society, Berkeley.

McGarigal, Kevin; Anthony, Robert.G.; Isaacs, Frank B. 1991. Interactions of humans and bald eagles on the Columbia River estuary. Wildlife Monographs. 115: 1–47.

Miller, Scott G.; Knight, Richard L.; and Miller, Clinton K. 1998. Influence of Recreational Trails on Breeding Bird Communities. Ecological Applications. 8(1):162-169.

Milne, Kathy. A. and Hejl, S.J. 1989. Nest-site characteristics of white-headed woodpeckers. Journal of Wildlife Management 53(1):50-55.

Nussbaum, R. A. 1974. The distributional ecology and life history of the Siskiyou Mountains salamander, Plethodon stormi, in relation to the potential impact of the proposed Applegate Reservoir on this species. Unpublished report submitted to U.S. Army Corps of Engineers.

Nussbaum, R. A., E. D. Brodie, and R. M. Storm. 1983. Amphibians and reptiles of the Pacific Northwest. University of Idaho Press, Moscow, ID.

Ollivier, Lisa M.; Welsh Hart H.; and Clayton David C. 2001. Habitat correlates of the Siskiyou Mountains salamander, Plethodon stormi (Caudata: Plethodontidae); with comments on the species' range. USDA Forest Service, Redwood Sciences Laboratory. Unpublished report.

Ouren, Douglas S.; Haas, Christopher; Melcher, Cynthia P.; Stewart, Susan C.; Ponds, Phadrea D.; Sexton, Natalie R.; Burris, Lucy; Fancher, Tammy; and Bowen, Zachary H. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management Lands: A Literature Synthesis, Annotated Bibliographies, Extensive Bibliographies, and Internet Resources. USDI, U.S. Geological Survey Open File Report 2007-1353.

Phillips, G.E.; Alldredge, A.W. 2000. Reproductive success of elk following disturbance by humans during calving season. Journal of Wildlife Management. 64(2): 521–530. (as cited in Gaines 2003).

Philpot, W. 1997. Summaries of the life histories of California bat species. U.S. Department Agriculture, Forest Service. Sierra National Forest, Pineridge Ranger Station. 30pp. Unpublished Document.

Pierson, E.D. 1996. Presentation to the Natural History and Management of Bats in California and Nevada Workshop. Nov. 13-15. Sacramento, California.

Raphael, Martin. G. and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. Wildlife Monographs. No. 84, 66 pp. (as cited in Hillis et al., undated)

Rowland, Mary M., Wisdom, Michael J., Johnson, Bruce K., and Penninger, Mark A. 2004. Effects of Roads on Elk: Implications for Management in Forested Ecosystems. Pages 42-52 in Wisdom, M.J., technical editor, The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Alliance Communications Group, Lawrence, Kansas, USA.

Rumble, Mark A.; Benkobi, Lakhdar; and Gamo, R. Scott. 2007. A different time and place test of ArcHSI: A spacially explicit habitat model for elk in the Black Hills. U.S. Department of Agriculture, Forest Service. RMRS-RP-64. 16 pp.

Schempf, P. F., and M. White. 1977. Status of six furbearer populations in the mountains of northern California. U.S. Department Agriculture, Forest Service, San Francisco, Calif. 51pp. (as cited in CDFG 1990).

Sherwin, R. 1998. Presentation to the Western Bat Working Group Workshop. Feb. 9-13. Reno, Nevada.

Siskiyou County 2007. Siskiyou County Draft Deer Management Plan.

Talley, Robert. 2009. [Personal communication]. March 17. Klamath National Forest, Yreka, California.

Torpin, Dianne. 2009. [Personal communication]. March 10. Klamath National Forest, Yreka, California

Trombulak, Stephan C.; Frissell, Christopher.A. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology. 14: 18-30.

USDI Fish and Wildlife Service. 1986. Pacific Bald Eagle Recovery Plan. U.S. Fish and Wildlife Service, Portland, Or. 163 pp.

U.S. Department of Agriculture, Forest Service; U.S. Department of Commerce, National Marine Fisheries Service; U.S. Department of Interior, Fish and Wildlife Service, Bureau of Land Management, and National Park Service; and Environmental Protection Agency. 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment, Report of the Forest Ecosystem Management Assessment Team.

U.S. Department of Agriculture, Forest Service and U.S. Department of Interior, Bureau of Land Management. 1994. Final environmental impact statement on management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Portland, OR.

U.S. Department of Agriculture, Forest Service. 1995. Land and Resource Management Plan. Klamath National Forest.

U.S. Department of Agriculture, Forest Service. 1977. Bald Eagle Habitat Management Guidelines. Forest Service, Region 5. 60pp

U.S.Department of Agriculture, Forest Service. 2003. TRTE Local habitat associations and range description. Klamath National Forest, Yreka, CA.

U.S. Department of Agriculture, Forest Service. 2008. Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project Wildlife Report. Klamath National Forest.

U.S. Department of Agriculture, Forest Service. 2009. Pacific Southwest Region. Threat of Deforested conditions in California's National Forests. http://www.fs.fed.us/r5/rsl/projects/postfirecondition/. Accessed 16 March, 2009.

U. S. Department of Interior 1992. Recovery plan for the Northern spotted owl. Final Draft. 2 volumes. U.S. Fish and Wildlife, Portland, Oregon.

U. S. Department of Interior, Fish and Wildlife Service. 2002. Western grey squirrel. Frequently asked questions. Undated. http://www.fws.gov/pacific/news/2002/121/faq.pdf [2009, March 15]

U.S. Department of Interior, Fish and Wildlife Service. 2006. Informal consultation concurrence letter with U.S. Department of Agriculture, Forest Service Region 5 on Travel Management Project Design Criteria. December 27, 2006. Sacramento, California.

U. S. Department of Interior, Fish and Wildlife Service 2006. Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California. Guidance provided by US Fish and Wildlife Service. Arcata, California.

U. S. Department of Interior, Fish and Wildlife Service. 2008. Arcata Fish and Wildlife [Online] 2008, October 30-last update). Bald eagle species profile. Available: http://www.fws.gov/arcata/es/birds/baldEagle/b_eagle.html [2009, April 7]

Verts, B. J. and L.N. Carraway. 1998. Land Mammals of Oregon. University of California Press. Berkeley and Los Angeles. 668 pp.

Walters, Eric L.; Miller, Edward H.; and Lowther, Peter E. 2002. Red-breasted Sapsucker (Sphyrapicus ruber), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America [Online]: http://bna.birds.cornell.edu/bna./species/663a [2009, April 8]

Ward, A. Lorin; and Cupal, JerryJ. 1979. Telemetered heart rate of three elk as affected by activity and human disturbance. In: Shaw, J., ed. Symposium on dispersed recreation and natural resource management. Logan, UT: Utah State University, College of Natural Resources: 47 56. (as cited in Rumble et al. 2007).

Wasser, Samuel K.; Bevis, Kenneth; King, Gina; and Hanson, Eric. 1997. Noninvasive physiological measures of disturbance in the northern spotted owl. Conservation Biology 11(4):1019-1022 (as cited in Gaines et al. 2003).

Watson, James W. 1993. Responses of nesting bald eagles to helicopter surveys. Wildlife Society Bulletin. 21: 171–178. Abstract.

Weasma, T.R. 1999. Draft Management Recommendations for Trilobopsis tehama, tehama Chaparral and Trilobopsis roperi, Shasta Chaparral (Land Snails), Version 2.0 by T.R., in Management Recommendations for Survey and Manage Terrestrial Mollusks, Version, 2.0 by T. E. Burke, J.S. Applegarth, T. R. Weasma and N. Duncan, Editor. October 1999.

Welsh, J. Hartwell Jr. and Lind, Amy J. 1996. Habitat Correlates of the Southern Torrent Salamander, Rhyacotriton variegatus (Caudata: Rhyacotritonidae), inNorthwestern California. Journal of Herpetology, Vol. 30, No. 3, pp. 385-398, 1996.

Wisdom, Michael .J.; Bright, L.R.; Carey, C.G. [and others]. 1986. A model to evaluate elk habitat in western Oregon. R6-F&WL-216-1986. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest region. 36 p. (as cited in Allison et al. 2007).

Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendael J.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; and Eames, Michelle R. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: broad-scale trends and management implications. V. 1. Gen. Tech. Rep. PNW-GTR-485. Portland, OR. U.S. Department of Agriculture, Forest Service, U.S. Department of Interior, Bureau of Land Management. 156 pp.

Woodbridge, Brian. 1998. Swainson's Hawk (Buteo swainsoni). In The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. Available: http://www.prbo.org/calpif/htmldocs/species/riparian/swainsons_hawk.htm [April 6, 2009].

Woodbridge, Brian. 2009. [Personal communication]. April 6. U.S. Fish and Wildlife Service, Yreka, California.

Woodbridge, Brian; Finley, Karen K.; and Seager Trent S. 1995. An investigation of the Swainson's hawk in Argentina. J. Raptor Res. 29(3):202-204.

Yaeger, J. S. 2005. Habitat at fisher resting sites in the Klamath Province of northern California. MS Thesis, Humboldt State University, Arcata, California, USA.

Yeager, J. Scott. 2005. [Personal communication]. U.S. Fish and Wildlife Service, Yreka, California

Johnson, Dave. 2009. [Personal communication]. March 19. U.S. Fish and Wildlife Service, Yreka, California

Zielinski, William J.; Slauson, Keith M.; and Bowles, Ann E. 2007. The effect of off-road motor vehicle use in California, USA. Final Report to the USDA Forest Service, Pacific Southwest Region, and California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division. 30 pp.

Heritage Resources

Bright, William. 1978 Karuk. In California, R. F. Heizer, editor. Pp. 180-189. Handbook of North American Indians, Volume 8, W. C. Sturdevant, general editor. Washington D.C.: Smithsonian Institution.

Cressman, Luther S. 1942. Archaeological Researches in the Northern Great Basin. Washington D. C.: Carnegie Institution Publication 538.

Fentress, Jeffrey B. 2002. The Archaeology of Butte Valley, Siskiyou County, California. Ph.D. dissertation, Anthropology Department, University of Oregon.

Goebel, Ted. 1996. Paleoindians in the Shadow of Mount Shasta: New Research in Butte Valley, Northeastern California. Paper presented at the 61st Annual Meeting of the Society for American Archaeology, New Orleans.

Jensen, P. M., and A. E. Farber. 1982. Archaeological Data Recovery Program at CA-SIS-342. Submitted to California Department of Transportation, Redding.

Mack, Joanne M. 1991. Klamath River Canyon Prehistory and Ethnology. Bureau of Land Management Cultural Resources Series 8.

Mack, Joanne M. Portland.1989. Archaeology of the Upper Klamath River. The Proceedings of the 1989 Symposium on the Prehistory of Southwest Oregon. Nan Hannon and Richard K. Olmo, editors. Pp. 7-9. Medford.

Mack, Joanne M. 1979. Archaeological Investigations of the Salt Creek Locality: Subsistence Uniformity and Cultural Diversity Along the Klamath River, Oregon. Ph.D. dissertation, Anthropology Department, University of Oregon.

Palmer, Gary B. 1980. Karok World Renewal and Village Sites: A Cultural and Historical District. Ms on file, Klamath National Forest.

Ray, Verne F.1963. Primative Pragmatists: The Modoc Indians of Northern California. Seattle: University of Washington Press.

Silver, S. 1978. Shastan Peoples. In California, R. F. Heizer, editor. Pp. 211-224. Handbook of North American Indians, Volume 8, W. C. Sturdevant, general editor. Washington D.C.: Smithsonian Institution.

Stern, T. 1998. Klamath and Modoc. In Plateau, D. E. Walker, editor. Pp. 446-466. Handbook of North American Indians, Volume 12, W. C. Sturdevant, general editor. Washington D.C.: Smithsonian Institution.

USDA Forest Service. 2005. Policy for Section 106 of the NHPA Compliance in Travel Management: Designated Routes for Motor Vehicle Use. On file, USDA Forest Service Pacific Southwest Region, Vallejo.

USDA Forest Service. 2006. Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, U.S.D.A. 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. On file, USDA Forest Service, Pacific Southwest Region, Vallejo.

USDA Forest Service. 1995 Klamath National Forest Land and Resource Management Plan.

Winthrop, Kathryn R. and Robert H.. 1991. Konomihu Studies: Ethnology and Archaeological DataRecovery, CA-SIS-1457. Ms on file, Klamath National Forest.

Botanical Resources

California Native Plant Society 2008. The CNPS Ranking System. http://www.cnps.org/cnps/rareplants/ranking.php.

CNPS 2008. California On-line Inventory of Rare and Endangered Plants of California. Available online at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi

California Natural Diversity Database 2008. RareFind Version 3.1.0 California Department of Fish and Game. Accessed March 2008.

Cole, D.N. and Bayfield, N.G. 1993 Recreational Trampling Of Vegetation: Standard Experimental Procedures. Biological Conservation 63: 209-215

Collidge, S. K. 1996. Ecological consequences of habitat fragmentation: implications for landscape architecture and planning. Landscape and Urban Planning. Volume 36, Issue 1, October 1996, pp. 59-77.

D'Antonio, C.M., N. E. Jackson, C. C. Horvitz, and R. Hedberg. 2004. Invasive plants in wildland ecosystems: merging the study of invasion processes with management needs. Frontiers in Ecology anf the Envirionment. Ecological Society of America, Vol. 2, No. 10, pp. 513-521.

Donaldson, J., I Nanni, C. Zachariades, and J. Kemper. 2002. Effects of habitat fragmentation on pollinator diversity and plant reproductive success in Renosterveld shrublands of South Africa. Journal of Conservation Biology, Volume 16, Issue 5, pp. 1267-1276.

Harrison, S. and E. Bruna. 1999. Habitat fragmentation and large-scale conservation: What do we know for sure? Ecography, Volume 22, Issue 3, pp. 225-232.

Hickman, James C. (ed.). 1993. The Jepson Manual. Berkeley, CA: University of California Press.

Jules, E. S. 1998. Habitat fragmentation and demographic change for a common plant: Trillium in old growth forest. Ecology, Volume 79, No. 5, pp. 1645-1656, July 1998.

MacDonald, L. H. 2000. Evaluating and managing cumulative effects: process and constraints. Environmental Management Vol. 26, No. 3, pp. 299-315.

Mack R. N., Simberloff D, Lonsdale WM,Evans H, Clout M, Bazzaz FA. 2000. Biotic invasions: Causes, epidemiology, global consequences and control. Ecological Applications 10: 689–710.

Tibor D. P. [ed.] 2001. CNPS inventory of rare and endangered plants of California, 6th ed. California Native Plant Society, Sacramento, California, USA. No longer in print but selected sections available online at: http://www.cnps.org/cnps/rareplants/inventory/6th_edition.php.

National Forest Management Act. 1976. Available online at: http://www.fs.fed.us/emc/nfma/includes/NFMA1976.pdf.

NatureServe 2008. NatureServe Conservation Status. Version 7.0 (1 February 2008). Data last updated June 2008. http://www.natureserve.org/explorer/ranking.htm#global. Data accessed July 2008.

Ouren, D.S., Haas, Christopher, Melcher, C.P., Stewart, S.C., Ponds, P.D., Sexton, N.R., Burris, Lucy, Fancher, Tammy, and Bowen, Z.H. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353, 225 pages

Resource Planning Act. 1974. Available online at: http://www.ncrs.fs.fed.us/4801/national-programs/rpa/.

Trombulak, S.C., and C.A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1):18-30.

USDA Forest Service, Klamath National Forest. 1995. Land and Resource Management Plan. On file at Klamath National Forest Supervisor's Office, Yreka, CA.

USDA forest Service. 1997. Forest Service Manual. Available online at http://www.fs.fed.us/im/directives/dughtml/fsm.html. Updated November 1997.

USDA Forest Service 2000. Forest Service Habdbook. Available online at: http://www.fs.fed.us/im/directives/dughtml/fsh_1.html.

USDA Forest Service, 2001. Klamath and Shasta-Trinity National Forests. Noxious and Invasive Weeds Program Strategy—Northern Province. Anne Yost, and Ken Coop, October 22, 2001. Available at the KNF Supervisor's Office, Yreka, CA.

USDA Forest Service and USDI Bureau of Land Management. 2001. Record of decision and standards and guidelines for amendments to the survey and manage, protection buffer, and other mitigation measures standards and guidelines. On file at Klamath National Forest Supervisor's Office, Yreka, CA.

USDA Forest Service and USDI USFWS. 2002. Conservation Agreement between the U. S. Fish and Wildlife Service and the U. S. Forest Service for Mt. Ashland lupine and Henderson's horkelia. On file at Klamath National Forest Supervisor's Office, Yreka, CA.

USDA Forest Service. 2005. Conservation Assessment for Cypripedium fasciculatum and Cypripedium montanum. Region 5-USDA Forest Service. T. N. Kaye and J. R. Cramer, Institute for Applied Ecology. On file at Klamath National Forest Supervisor's Office, Yreka, CA.

USDA Forest Service. 2006. Conservation Assessment for Ptilidium californicum (Aust.) Underw. USDA Forest Service, California Region. J. A. Harpel & L. D. Hoover. On file at Klamath National Forest Supervisor's Office, Yreka, CA.

USDI. U.S. Fish and Wildlife Service (USFWS). 2002. Conservation Agreement between the U.S. Fish and Wildlife Service and the U.S. Forest Service for the Mt. Ashland lupine and Henderson's horkelia. Available at the Klamath National Forest Supervisor's Office, Yreka, CA.

USDI. U. S. Fish and Wildlife Service (USFWS). 2006. Travel Management Project Design Criteria. Letter of Concuurence. Available at the Klamath National Forest Supervisor's Office, Yreka, CA.

USDI. U. S. Fish and Wildlife Service (USFWS). 2006b. Recovery Plan for Phlox hirsute (Yreka Phlox). Available online at: http://ecos.fws.gov/.

USDI. U. S. Fish and Wildlife Service (USFWS). 2008. Arcata Fish and Wildlife Office Species List Search Page. Located on-line at http://www.fws.gov/arcata/specieslist/search.asp.

Von der Lippe, M. and I. Kowarik. 2007. Long-distance dispersal of plants by vehicles as driver of plant invasions. Conservation Biology, 21 (4), 986-996.

Wilshire, H.G., Shipley, Susan, and Nakata, J.K. 1978. Impacts of off-road vehicles on vegetation: Transactions of the North American Wildlife and Natural Resources Conference, v. 43, p. 131–139.

Yorks, T. P., N. E. West, R. J. Mueller, and S. D. Warren. 1997. Toleration of traffic by vegetation: Life form conclusions and summary, extracts from a comprehensive database. Environmental Management pp. 121-131.

Young, A., T. Boyle, and T. Brown. 1996. The population genetic consequences of habitat fragmentation for plants. Trends in Ecology and Evolution, Volume 11, Issue 10, pp. 413-418, October 1996.

Non-native Invasive Species

Brooks, M.L. and B. Lair. 2005. Ecological Effects of Vehicular Routes in a Desert Ecosystem. Report prepared for the United States Geological Survey, Recoverability and Vunerabiltyof Desert Ecosystems Program (http://geography.wr.usgs.gov/mojave/rvde)

California Department of Food and Agriculture (CDFA). 2004. ENCYCLOWEEDIA: Notes on Identification, Biology, and Management of Plants Defined as Noxious Weeds by California Law. http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm.

California Department of Food and Agriculture(CDFA). 2007. Noxious Weed Pest Ratings. Accessed at http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/pdfs/noxiousweed_ratings.pdf Last updated January 2007.

Cal-IPC. 2006. California Invasive Plant Inventory. Cal-IPC Publication 2006-02. California Invasive Plant Council: Berkeley, CA. Available: www.cal-ipc.org.

Christen D.C. and G.R. Matlack. 2008. The habitat and conduit functions of roads in the spread of three invasive plant species. Biol Invasions (2009) 11, pages 453–465.

Federal Register. 1999. Executive Order 13112 Invasive species. Vol. 64, No. 25 /Monday, February 8, 1999 / Presidential Documents.

Gelbard, J.L. and Harrison, S. 2003. Roadless habitats as refuges for native grasslands: interactions with soil, aspect, and grazing. Ecological Applications, 13(2), 2003, pages 404–415.

Mack, M.C., F.S. Chapin, E.S. Zavaleta, V.T. Eviner, R.L. Naylor, P.M. Vitousek, H.L. Reynolds, D.U. Hooper, S. Lavorel, O.E. Sala, S.E. Hobbie, S. Diaz. 2000. Consequences of changing biodiversity. Nature 405, pages 234-242, 11 May 2000.

Ouren, D.S., Haas, Christopher, Melcher, C.P., Stewart, S.C., Ponds, P.D., Sexton, N.R., Burris, Lucy, Fancher, Tammy, and Bowen, Z.H. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353, 225 pages.

Trombulaak, S. C. and C. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1), pages 18-30.

Tyser R.W. and C.A.Worley. 1992. Alien flora in grasslands adjacent to road and trail corridors in Glacier National Park, Montana (U.S.A.). Conservation Biology, Vol. 6, No. 2 (Jun., 1992), pages 253-262.

USDA Forest Service. 1995a. Klamath National Forest Land and Resource Management Plan.

USDA Forest Service. 1995b. Forest Service Manual, Chapter 2080. Noxious Weed Management.

USDA, Forest Service (USFS). July 5, 2001a. Guide to Noxious Weed Prevention Practices, version1.0. USFS. Washington, D.C.

USDA Forest Service. 2004. National Strategy and Implementation Plan for Invasive Species Management.

USDA, Forest Service. 2008. Klamath National Forest Noxious Weed List.

Von Der Lippe M. and I. Kowarik. 2007. Long-distance dispersal of plants by vehicles as a driver of plant invasions. Conservation Biology Volume 21, No. 4, pages 986–996.

Visual Resources

USDA Forest Service. 1974. National Forest Landscape Management Volume 2, Chapter 1, Visual Management System. Agricultural Handbook 462.

USDA Forest Service. 1995. Land and Resource Management Plan. Klamath National Forest, Yreka California.

USDA Forest Service. 1995. Landscape Aesthetics: A handbook for scenery management. Agriculture Handbook 701.

USDA Forest Service. 2001. National Visitor Use Monitoring Data. Klamath National Forest, Yreka California.

Transportation

USDA Forest Service. 1995. Land and Resource Management Plan. Klamath National Forest, Yreka California.

Social and Economic Resources

Byrd, Dennis. 2009. Outdoor Recreation Planner. DOI Bureau of Land Management, Medford Field Office. Email correspondence. February 17, 2009.

California Department of Finance. <www.dof.ca.gov> Accessed October 30, 2008.

Cann, Bruce. 2009. Outdoor Recreation Planner. DOI Bureau of Land Management, Arcata Field Office. Email correspondence. February 18, 2009.

Code of Federal Regulations Title 7 Section 15e. 1993. Enforcement of Nondiscrimination on the Basis of Handicap in Programs or Activities Conducted by the United States Department of Agriculture. October 26, 1993.

Code of Federal Regulations Title 36 Chapter 2 Part 212. 2005. Administration of the Forest Transportation System. December 2005.

Cordell, H.K. and C. Overdevest. 2001. Footprints on the Land: An Assessment of Demographic Trends and the Future of Natural Lands in the United States. Sagamore Publishing: 2001.

Doak, S.C and J. Kusel. 2009. "Well-Being Assessment of Communities in the Klamath Region." Prepared for the United States Forest Service, Klamath National Forest. <www.inforain.org/klamath/index> Accessed January 20, 2009.

DOI Bureau of Land Management. 2009. Draft Timber Mountain Recreation Management Plan Environmental Impact Statement. Medford District Office. 2009.

English, D.B.K., S.M. Kocis, S.J Zarnoch. And J.R. Arnold. 2001. "Forest Service National Visitor Use Monitoring Process: Research Method Documentation." USDA Forest Service. May 2001. <http://www.fs.fed.us/recreation/programs/nvum/methods/methods052001.rtf> Accessed November 14, 2008.

Federal Register Volume 73 Number 11. 2008. Information Collection; Forest Products Removal Permits and Contracts. January 16, 2008.

Federal Register Volume 73 Number 195. 2008. Notice of Intent, Klamath National Forest, CA, Klamath National Forest Motorized Travel Management EIS. October 7, 2008.

Federal Register Volume 73 Number 237. 2008. Travel Management; Designated Routes and Areas for Motor Vehicle Use. December 9, 2008.

Fischer, G. 2001. Communities of Interest: Learning through the Interaction of Multiple Knowledge Systems. Center for Life Long Learning and Design, University of Colorado, Boulder, CO 80309. 13 pgs.

Getches, D.H., R.A. Williams and C.F. Wilkinson. Cases and Materials on Federal Indian Law. West Publishing Company: 1998.

Headwaters Economics. Economic Profile System (EPS). 2007 Version. <www.headwaterseconomics.org> February 9, 2009.

Jackson County Oregon <www.co.jackson.or.us> Accessed January 8, 2009.

Martinez, Ruben. Personal Interview. July 15, 2008.

Minnesota IMPLAN Group (MIG). 2006 IMPLAN Data.

Office of the President. 1993. Executive Order 12862: Setting Customer Service Standards. September 1993.

Oregon Office of Economic Analysis. <http://www.oea.das.state.or.us/DAS/OEA/> Accessed January 2, 2009.

Portland State University. Population Research Center. <www.pdx.edu/prc/> Accessed January 6, 2009.

Seesholtz, D., D. Wickwar, and J. Russell. 2004. "Social Economic Profile Technical Guide." U.S. Dept. of Agriculture, Forest Service, Inventory Monitoring Institute. 2004.

Singleton, Claude. 2009. DOI Bureau of Land Management, Alturas Field Office. Phone Interview. February 20, 2009.

Siskiyou County, CA. 2005. "The Code of the West: the Realities of Rural Living." Office of County Administrator. Yreka, CA. 2005.

Siskiyou County, CA. 1996. "Siskiyou County Comprehensive Land and Resource Management Plan." Siskiyou County. 1996.

Siskiyou County, CA. 2008. "Siskiyou County Strategic Plan." Siskiyou County. 2008.

Stagg, Kenneth. 2009. Personal Communication. USDA Forest Service, Klamath National Forest. Forest Engineer. Yreka, CA. March 4, 2009.

State of California, 2008. Department of Motor Vehicles. Annual reports of off highway vehicles currently registered.

Stynes, D.J. and E.M. White. 2005. "Spending Profiles of National Forest Visitors, NVUM Four Year Report" Joint Venture Agreement Between USDA Forest Service IMI and Michigan State University, Joint Venture Agreement # 01-JV-11130149-203. May 2005.

US Bureau of Labor Statistics. <www.bls.gov> Accessed October 30, 2008.

US Bureau of Labor Statistics. North American Industry Classification System (NAICS) <www.bls.gov/bls/naics > Accessed October 30, 2008.

US Census Bureau. American Community Survey 2006. Accessed via American Fact Finder. <factfinder.census.gov> Accessed January 6 2009.

US Census Bureau. American Community Survey 3-Year Estimates, 2005-2007. Accessed via American Fact Finder. <factfinder.census.gov> Accessed January 6 2009.

US Census Bureau. Guidance on the Presentation and Comparison of Race and Hispanic Origin Data. <http://www.census.gov/population/www/socdemo/compraceho.html> Accessed October 30, 2008.

US Census Bureau. Population Change by County: Oregon <www.census.gov/popest/ archives/2000s/vintage_2002/CO-EST2002-02/CO-EST2002-02-41> Accessed January 6, 2009.

US Census Bureau. US Census 2000. Accessed via American Fact Finder. <factfinder.census.gov> Accessed October 23, 2008.

US Census Bureau. Small Area Income and Poverty Estimates. <http://www.census.gov/hhes/www/saipe/> Accessed December 9, 2008.

US Code Title 29 Section 794. 2007. Nondiscrimination Under Federal Grants and Programs. January 3, 2007.

USDA Forest Service. 1992. Forest Service Manual 1900 – Planning (FSM 1900). Amendment No. 1900-92-2. USDA Forest Service, Washington D.C. 1992.

USDA Forest Service. Inventory and Monitoring Institute. Travel Management Analysis: Economic Contribution Tools and Guidance. <http://fsweb.ftcol.wo.fs.fed.us/imi/economic_center/Travel%20Management%20Economics_economics.html> Accessed December 10, 2008.

USDA Forest Service. 2008. Land Areas of the National Forest System. FS-383. January 2008.

USDA Forest Service. Klamath National Forest. <www.fs.fed.us/r5/klamath/> Accessed January 22, 2009.

USDA Forest Service. 1995. Klamath National Forest. Land and Resource Management Plan. 1995.

USDA Forest Service. Klamath National Forest. Schedule of Proposed Actions (SOPA) Report: January 1, 2009 thru March 31, 2009. <www.fs.fed.us/sopa/forestlevel.php?110505> Accessed February 26, 2009.

USDA Forest Service. NRIS NVUM-HD 1.2.2.33. Accessed October 23, 2008.

Yreka Chamber of Commerce. <http://www.yrekachamber.com/> Accessed February 9, 2009.

Zaffarano, Sky. 2009. Outdoor Recreation Planner, DOI Bureau of Land Management, Redding Field Office. Personal Interview. February 5, 2009.

Inventoried Roadless Areas

USDA Forest Service. 1995. Land and Resource Management Plan. Klamath National Forest, Yreka California.

Geological Resources

U.S. Mine Safety and Health Administration. Fatality Demographics for 2003-2007. retrieved from http://www.msha.gov/sosa/SOSAFatalityStats2003-2007.pdf on 23 February 2009

Air Quality

Cox, P., Delao, A., Komornicxak, A., Weller, R. 2008. The California Almanac of Emissions and Air Quality – 2008 Edition. California Air Resource Board Retrieved from http://www.arb.ca.gov/aqd/almanac/almanac08/almanac08.htm on 4 March 2009.

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