3.04. Fire Fuels Management

This section focuses on analyses of the alternatives presented in this EIS and how they could affect current fire and fuels management on the Tahoe National Forest.

Affected Environment

Fire Management

Understanding past and present roles of fire in shaping Tahoe National Forest ecosystems is critical for managing fire. Fire, once a pervasive force in structuring and rejuvenating Tahoe National Forest ecosystems, is now intensively managed. Fire has been an important ecosystem process in the Sierra Nevada for thousands of years. Before the area was settled in the 1850s, fires were generally frequent throughout much of the range (Sierra Nevada Ecosystem Project 1996).

Because fire was so prevalent in the centuries before extensive Euro-American settlement (pre-settlement), many common plants exhibit specific fire-adapted traits such as thick bark and fire-simulated flowering, sprouting, seed release and/or germination (Chang 1996). In addition, fire affected the dynamics of biomass accumulation and nutrient cycling, and generated vegetation mosaics at a variety of spatial scales (Chang 1996). Because fire influenced the dynamics of nearly all ecological processes, reduction of the influence of fire through the 20th century fire suppression efforts in these ecosystem has had widespread (though not yet completely understood) effects.

Current management strategies and those of the immediate past have contributed to forest conditions that encourage high-severity fires. The policy of excluding all fires has been successful in generally eliminating fires of low to moderate severity as a significant ecological process. However, current technology is not capable of eliminating the high-severity fires. Thus, the fires that affect significant portions of the landscape, which once varied considerably in severity, are now almost exclusively high-severity, large, stand-replacing fires.

Changes in Fuels

The dramatic reduction in area burned in the 20th century, combined with the effects of forest management practices and generally warmer-moister climatic conditions (Graumlich 1993; Stein 1996), has almost certainly led to substantial increases in the quantity and changes in arrangement of live and dead fuels. While data from early 20th century are not available to test this assertion rigorously, it based on comparisons with early conditions inferred from numerous historical accounts, documented fire histories, and structures of uncut stands (Kilgore and Sando 1975; Parsons and DeBenedetti 1979; Bonnickson and Stone 1982; van Wagtendonk 1985; Biswell 1989; Weatherspoon and others 1992; Chang 1996; Skinner and Chang 1996; Weatherspoon and Skinner 1996).

Live and dead fuels increased along with the development of denser conifer forests. These increases in stand density were concentrated mainly in small and medium size classes of shade-tolerant and fire sensitive species. Lacking fire, the thinning that has occurred has been due to competition (primarily water and light), diseases, and insects. The result has been a large increase in amount and continuity of live forest fuels near the forest floor that provide a link between the surface fuels and upper canopy layers. The lack of fire has allowed dead fuels to accumulate in excess of their presettlement levels.

Twentieth Century Fire Regimes in Perspective

The Tahoe National Forest has recorded wildfires since establishment of the forest reserves in the early 1900s. The Tahoe National Forest has also compiled detailed information from fire reports for the period between 1976 and the present. Conclusions about recent fire regimes come from these two information sources as well as technical papers that have analyzed these data.

Twentieth century fire regimes in the Tahoe National Forest are very different from pre-European contact fire regimes. Intervals between present-day fires are longer, allowing more time for fuels and vegetation to accumulate between fires. As a result, fires have more fuel to burn and become more severe. Consequently, fires today kill more of the vegetation, and are difficult and dangerous to control.

Table 3.04-1 displays how the number and size of fires on the Tahoe National Forest have changed over time. Most fires in the Sierra Nevada are suppressed at a very small size. Less than one percent of the fires that started on Tahoe National Forest system lands in the last thirty years exceeded 100 acres. Fire fighting capability and efficiency has steadily improved through the century as fire suppression technologies have improved and expenditures for fire management have increased. The total number of fires started has declined by more than 50 percent. However the total number of acres burned has increased by more the four fold. In addition, the number of fires in every size category has increased. From 1992 to 2006 there were four fires greater than 5,000 acres compared to only one during the previous 15 years.

Table 3.04-1. Tahoe National Forest Acres burned in by size of fire

Years	1977-1991	1992-2006
Total Fires	2,263	1,050
Total Acres Burned	19,828	85,667
Fires greater than 50 acres	12	14
Fires Greater than 100 acres	11	12
Fires Greater than 1,000 acres	5	8
Fires greater than 5,000 acres	1	4

Trends in Fire Causes and Sizes and Fire Suppression Capability

Human-caused fires have been declining slowly but steadily over the century, likely as a result of increased fire suppression efficiency and improved public education (McKelvey and Busse 1996). However all of the fires greater than 5,000 acres in the last 15 years were human caused.

The number of lightning-caused fires has remained relatively constant over the century; however, over the last two decades the sizes of lightning-caused fires have increased. Lightning fires have generally been linked to fire occurrence episodes.

The availability of Forest Service firefighting resources and equipment has remained steady or declined over the past decade (Husari and McKelvey 1996). A similar trend has occurred in State firefighting agencies in Nevada and California. Additional resources are available through local fire departments, but these agencies are primarily dedicated to protecting lives and property in the immediate vicinity of their jurisdictions. Human populations are projected to increase in the Sierra Nevada over the next half century (Duane 1996). This will result in greater demands on local fire departments to provide fire protection to homes and communities during periods of high fire danger. In the future, additional firefighting resources may not be available to attack multiple lightning fires, especially during their initial stages.

Relationships between Climate and Fire Sizes and Causes

Based on 2,000-year tree ring records from giant sequoia groves, Swetnam (1993) concluded that fire activity has consistently decreased when rainfall has increased. The period from 1937 through 1986, has been the third wettest half-century in the past 1,000 or more years; it has been the fourth wettest half-century in the last 4,000 years (Stine 1996, Graumlich 1993). These wet conditions may have contributed to the success of fire suppression in limiting fire size.

Based on available records for the 20th century, McKelvey and Busse (1994) concluded that not all hot, dry years were extreme fire years; however, nearly all of the extreme fire years occurred during hot, dry periods. The greatest acreage burned coincides with critically dry years (as defined by the California Department of Water Resources) in the San Joaquin and Sacramento River Valleys. One-third of the years between 1901 and 1969, were ranked as dry or critically dry in at least one of the river valleys. Almost one-half of the years between 1970 and 1998 were ranked as dry or critically dry. Extreme fire years occurred during the critically dry years; these years reflect the correlation between lightning-caused fires, drought years, episodic events, and acres burned.

Wildland Urban Intermix Zone

The wildland urban intermix zone (WUI) is an area where human habitation is mixed with areas of flammable wildland vegetation. It extends out from the edge of developed private land into Federal, private, and State jurisdictions. The WUI is comprised of two zones: the defense zone and the threat zone.

Defense Zone

The WUI defense zone is the buffer in closest proximity to communities, areas with higher densities of residences, commercial buildings, and/or administrative sites with facilities. Defense zones generally extend roughly ¼ mile out from these areas; however, actual defense zone boundaries are determined at the project level following national, regional and forest policy. In particular, the Healthy Forest Restoration Act of 2003 identifies areas to be included in the WUI. Local fire management specialists determine the extent, treatment orientation, and prescriptions for the WUI based on historical fire spread and intensity, historical weather patterns, topography, access. Defense zones are of sufficient extent that fuel treatments within them will reduce wildland fire spread and intensity sufficiently for suppression forces to succeed in protecting human life and property.

The WUI threat zone typically buffers the defense zone; however, a threat zone may be delineated in the absence of a defense zone under certain conditions, including situations where the structure density and location do not provide a reasonable opportunity for direct suppression on public land, but suppression on the private land would be enhanced by fire behavior modification on the adjacent public land.

Threat Zone

Threat zone boundaries are determined at the project level following national, regional and forest policy. Threat zones generally extend approximately 1¼ miles out from the defense zone boundary; however, actual extents of threat zones are based on fire history, local fuel conditions, weather, topography, existing and proposed fuel treatments, and natural barriers to fire. Fuels treatments in these zones are designed to

reduce wildfire spread and intensity. Strategic landscape features, such as roads, changes in fuels types, and topography may be used in delineating the physical boundary of the threat zone.

Environmental Consequences

Weather, topography, and fuels influence the behavior of fires. Motor vehicle access into an area can lead to an increased risk of a wildfire being started by humans. Wildfires can be started by the vehicles themselves; i.e. sparks from exhaust or hot pieces of metal such as exhaust pipes coming into contact with vegetation. In addition human activities in the back country such as camping and hunting can also lead to an increased risk of wildfires starting. Motor vehicle use provides access to larger areas for these activities and hence a larger area for potential risk of human caused fires.

Road access into an area is also a benefit for fire suppression. Road access allows for a more rapid initial attack by suppression forces increasing the chance that a wildfire may be stopped at a smaller size. In addition to quicker access, roads can also allow heavier equipment such as fire engines and bull dozers to reach the fire and thus stop the fires at a smaller size. Changes in fuels alter fire behavior and also change how fires affect ecosystem components and processes.

Measures or Factors Used to Assess Environmental Consequences

The alternatives can be compared in terms of; 1) how they increase the risk of a wildfire being started by humans based the level of access by motorized vehicles and the 2) amount of roads accessible allowing for a more rapid initial attack by suppression forces with heavier equipment such as fire engines and bull dozers.

Risk of Human Caused Wildfire

Although the amount of human caused fires has been decreasing over time, motor vehicle access into an area can lead to an increased risk of a wildfire being started by humans. Wildfires can be started by the vehicles themselves; i.e. sparks from exhaust or hot pieces of metal such as exhaust pipes coming into contact with vegetation. In addition human activities in the back country such as camping and hunting can also lead to an increased risk of wildfires starting. Motor vehicle use provides access to larger areas for these activities and hence a larger area for potential risk of human caused fires. To assess the changes in potential risk the density of open routes accessible by the public was used a potential indicator. Table 3.04-2 displays the categories used to assess this risk;

Table 3.04-2. Risk Assessment Categories Used For Human Caused Fire

Density of Roads and Trails Open for Motor Vehicles by Watershed	Degree of Potential Risk
0 Miles/Square Mile	Lowest Risk
0-2 Miles/Square Mile	Lower Risk
2-4 Miles/Square Mile	Moderate Risk
4-6 Miles/Square Mile	Higher Risk
6 Plus Miles/Square Mile	Highest Risk

Table 3.04-3 displays the level risk of human caused wildfire by alternative. The greatest level of risk is associated with Alternative 1, the No-Action Alternative. All of the action alternatives reduce the level of risk. Of the action alternatives, the least reduction in risk is

associated with Alternative 5. Alternatives 2, 3, 4, 6 and 7 all have similar reductions in risk of human caused wildfire.

Table 3.04-3. Changes in Risk of Human Caused Wildfire by Alternative

Risk of Human Caused Wildfire		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Route Density (Percent of Forest Total)	Lowest Risk (0 Miles/Square Mile)	<1%	<1%	<1%	<1%	<1%	<1%	<1%
	Lower Risk (0-2 Miles/Square Mile)	17%	25%	27%	25%	25%	25%	25%
	Moderate Risk (2-4 Miles/Square Mile)	44%	56%	56%	56%	53%	56%	56%
	Higher Risk (4-6 Miles/Square Mile)	32%	15%	13%	14%	18%	15%	15%
	Highest Risk (>6 Miles/Square Mile)	7%	4%	4%	4%	5%	4%	4%

Figure 3.04-1. Human caused wildfires, such as the Gap Fire, can damage forest resources

Access by Suppression Forces

Road access into an area is also a benefit for fire suppression. Road access allows for a more rapid initial attack by suppression forces increasing the chance that a wildfire may be stopped at a smaller size. In addition to quicker access, roads can also allow heavier equipment such as fire engines and bull dozers to reach the fire and thus stop the fires at a smaller size.

Access by these vehicles is particularly important in the wildland urban intermix zone (WUI). The wildland urban intermix zone is an area where human habitation is mixed with areas of flammable wildland vegetation. It extends out from the edge of developed private land into Federal, private, and State jurisdictions.

Table 3.04-4 displays the miles of roads useable by heavier equipment such as fire engines and bull dozers to reach the fire and thus stop the fires at a smaller size within the wildland urban intermix zone (WUI) as well as within the total forest.

Table 3.04-4. Access for fire suppression equipment by alternative

Access for Fire Suppression Equipment		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Roads useable by fire suppression equipment (miles)	**Wildland urban intermix zone (WUI)**	1,714	1,026	1,026	1,026	1,026	1,026	1,026
	Forest Total	**3,918**	**3,529**	**3,529**	**3,529**	**3,529**	**3,529**	**3,529**

The greatest level of access is associated with Alternative 1, the No-Action Alternative. All of the action alternatives reduce the level of access and all similar reductions in access to allow heavier equipment such as fire engines and bull dozers to reach the fire and thus stop the fires at a smaller size.

Figure 3.04-2. Roads, such as the Bowman Road shown here, provide important access for fire suppression equipment

3.05. Heritage Resources

Introduction

The Congress in 1966 declared as National policy that the Federal government will "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 policy 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.

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)).

Regulatory Environment for Heritage Resources

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 of 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 regulations at 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 the use of programmatic agreements for compliance with Section 106 of the NHPA.

Section 106 of the NHPA and the Advisory Council on Historic Preservation's (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. 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* (2006) (**Motorized PA**). This agreement defines the Area of Potential Effects (**APE**) (36 CFR 800.4(a)(1)) and includes a strategy outlining the requirements for cultural resource inventory, evaluation of historic properties, and effect determinations; it also includes protection and resource management measures that may be used where effects may occur.

Executive Order 11593 - *Protection and Enhancement of the Cultural Environment*, issued May 13, 1971, directs Federal agencies to inventory cultural resources under their jurisdiction, to nominate Federally owned properties that meet the NRHP criteria to the National Register of Historic Places, 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.

Tahoe National Forest cultural resource specific standard and guidelines are described in Chapter 2 of the EIS.

Affected Environment

Heritage resources are archaeological, cultural, and historical legacies from our past and are more than 50 years old. Heritage resource information, combined with environmental data, can illuminate past relationships between people and the land. Cultural-ecological relationships, the result of both natural processes and approximately 10,000 years of human interaction in the North-Central Sierra Nevada, are key topics in this region's anthropological, archaeological, and historical research.

Heritage Resources in the Tahoe National Forest

With 3,228 recorded sites, the Tahoe National Forest contains numerous prehistoric and historic archaeological sites, buildings, features and objects. Research of cultural resources discovered within the Tahoe National Forest indicate that people have been using the Forest for over 8,000 years, with the heaviest use occurring within the last 5,000-4,000 years. By 5,000 years ago on the Westside of the Forest, permanent villages were established at elevations generally below 3,500 feet (snow line). On the Eastside of the Forest, winter villages were located in the lower elevation valleys where Reno and Carson City, Nevada, are located. Prior to the crossing of the Sierra Nevada by emigrant parties, an extensive trail system was established by Native people for travel and trade. Many of these trails became major travel

routes into California during the historic era. Two Native American ethnographic groups, the Nisenan Maidu and the Washoe, have direct ties to Tahoe National Forest managed land.

Table 3.05-1. Heritage Resources within the Tahoe National Forest

Type of Site	# Sites
Total Documented Sites	3,228
National Register Listed Properties	7

Sites representing prehistoric and ethnographic land use include seasonal villages, temporary camps, toolstone quarries, bedrock mortar milling locations, and petroglyphs. People today favor many of the areas preferred by Native people. Resource extraction, grazing, residential development, and recreation are common modern activities throughout the Forest.

During the late 1830s and 1840s, trappers and explorers began venturing into California. With the discovery of gold in Coloma in 1848 came a massive emigration of gold seekers and settlers into the area now encompassed by the Tahoe National Forest. Numerous trails and routes crossed the Forest including various branches associated with the Overland Emigrant Trail, the Placer County Emigrant Trail, and the Henness Pass Road. These early roads were established to access different mining communities. Local toll roads and turnpikes like the Michigan to Last Chance Trail, the Enterprise and the Pacific Turnpikes, the Skillman Flat Toll Road, the Galloway Ridge Road and the Sierra Turnpike were constructed to link settlements and transport supplies. The completion of the Central Pacific Railroad across the North-Central Sierra Nevada established this route as one of the major transportation corridors into California. Four of California's original 64 State Highways, both the Victory and Lincoln Highways, are within the Tahoe National Forest (25, 36, 38 and 37) as is part of the Tahoe to Ukiah Highway (State Route 20). The Victory and Lincoln Highways followed the corridor of the Central Pacific Railroad. This corridor eventually became Highway 40 and Interstate 80. These routes have played an important part in changing the environment as the access to the Forest allowed for early and extensive development.

Historic mining is only located on the Westside of the Forest. Due to the deeply incised nature of the terrain, many of the sites are located in the river bottoms of the Yuba, Bear, and American Rivers or along the ridge tops. This area of California was one of the richest producing gold areas in the State. Consequently, hundreds of mines and roads to access the mines were established early on in the 1850s.

Logging occurred throughout the entire Forest and an extensive network of logging road and railroad grades were built to supply lumber and various wood products to support other industries (mining, construction, fuel for steam power, and shipping containers). On the Eastside of the Forest, with its open Eastside Pine habitat and terrain, logging, ranching, and ice production were primary industries. Beginning in the 1890s, railroad based logging extended from the Central Pacific Railroad to the farthest reaches of the Forest on the Eastside and eventually linked into the Feather River Canyon railroad line on the north end of Sierra Valley. Many of these railroad grades provide the footprint for many roads on the Eastside. On the Westside of the forest, large scale commercial logging companies focused on relatively easy to log terrain that bordered the Central Pacific Railroad. In the rugged mountainous mining areas of Downieville and Foresthill, local mills supplied more local needs and markets. Logging has continued until recent years as a dominate industry in the Tahoe National Forest.

Historic heritage resources reflect particularly the cultural and economic products of the rapid pace of technological achievement in the last two centuries superimposed over the varied terrain of the Sierra Nevada. These more recent resources often reflect environmental changes made possible by industrial and technological advances in resource extraction, landscape use and management.

Sites representing historic land use include cabins, roads and trails, bridges, lumber or mining mill complexes, town sites, ditches, homesteads, sheep camps, arbor glyphs (tree carvings), railroad grades, trestles, mining shafts and admits, ground sluicing areas and tailings, Forest Service administrative buildings and compounds, along with logging, mining, grazing, and recreation landscapes. Nearly all of the historic sites found in the Tahoe National Forest date from ca. 1846 to the present. Historic sites provide many opportunities for interpretation and public appreciation.

Relationship between Heritage Resources and Motorized Vehicle Use on the Tahoe National Forest

The archaeological inventory was completed under provisions of the Motorized PA. The inventory consisted of a combination of existing record reviews, on-the-ground survey, and monitoring. One hundred forty-six (146) archaeological sites were documented as associated with proposed additions to the National Forest Transportation System. These sites represent archaeological remains from primarily historic mining and logging activities along with evidence of Native American occupation. One National Register listed historic property, the Stampede Archaeological District, is located at Stampede Reservoir. Table 3.05-2 displays the sites in the Area of Potential Effect (APE) by route.

Table 3.05-2. Summary of Heritage Resources Identified by Route

Note: Under resource type, prehistoric indicates Native American sites; historic designates sites that date from 1846 until 50 years ago, and multicomponent refers to a location that contains artifacts and/or features from both time periods.

Route ID	Resource ID	Resource Type
25-9_p	05175300469	Prehistoric
39-5_p	05175300217	Historic
39-5_p	05175300342	Prehistoric
491-3_1	05175300337	Multicomponent
491-3_2	05175300216	Historic
ARM-5	05175400124	Prehistoric
ARN-001	05175500317	Prehistoric
Boca Reservoir Open Area	05175700241	Historic
Boca Reservoir Open Area	05175700303	Prehistoric
Boca Reservoir Open Area	05175700305	Prehistoric
Boca Reservoir Open Area	05175700307	Prehistoric
Boca Reservoir Open Area	05175700175/CA-NEV-82	Multicomponent
Boca Reservoir Open Area	05175700240/CA-NEV-81	Prehistoric
Boca Reservoir Open Area	CA-NEV-26	Multicomponent
Eureka Diggings	05175300004	Historic
Eureka Diggings	05175300023	Prehistoric
Eureka Diggings	05175300230	Historic
H11E10	05175300696	Historic
H1-2	05175700297	Prehistoric

Route ID	Resource ID	Resource Type
H25-11-3	05175300031	Historic
H261-8	05175700558	Prehistoric
H261-8	05175700563	Prehistoric
H27-19	05175300032	Historic
H293-4-4	05175300385	Prehistoric
H293-4-4	05175300637	Historic
H301-6	05175300176	Historic
H301-6	05175300188	Multicomponent
H3-4-4	05175700148	Prehistoric
H50-12-3-1	05175500035	Historic
H54-9	05175600283	Historic
H54-9	05175600341	Multicomponent
H54-9	05175600317	Prehistoric
H652-5-5	05175500481	Prehistoric
H833-10	05175500458	Historic
H833-10	05175500459	Multicomponent
H88-44	05175400215	Prehistoric
H889-28	05175700088	Prehistoric
H889-3-18-5	05175700563	Prehistoric
H889-3-30-10	05175700304	Prehistoric
H889-3-30-10	05175700307	Prehistoric
H889-3-30-5	05175700303	Prehistoric
H889-8	05175700395	Multicomponent
H889-8	05175700401	Prehistoric
H894-5-1	05175700240	Prehistoric
N25-1-1	05175300347	Prehistoric
N25-1-1	05175300348	Prehistoric
N25-2 and N25-2-3	05175300454	Prehistoric
N25-6-1	05175300356	Prehistoric
N25-7	05175300034	Prehistoric
N261-8-15-2	05175700563	Prehistoric
N27-3	05175300514	Historic
N27-5	05175300446	Prehistoric
N39-5	05175300217	Historic
N43-6-2	05175400368	Historic
N860-20-1	05175600426	Prehistoric
N860-20-1	05175700540	Prehistoric
N886-14-10	05175700577	Historic
N886-1-5	05175700009	Multicomponent
N886-1-5	05175700409	Multicomponent
N886-18-10	05175700447	Prehistoric
N886-18-10	05175700529	Prehistoric
N889-3-30-10	05175700304	Prehistoric

Route ID	Resource ID	Resource Type
N890-14-5	05175700511	Prehistoric
N96-34-2-6	05175400325	Prehistoric
Prosser Reservoir Open Area	05175700460	Prehistoric
Prosser Reservoir Open Area	05175700609	Multicomponent
Prosser Reservoir Open Area	05175700608/CA-NEV-64	Prehistoric basalt quarry,
Prosser Reservoir Open Area	CA-NEV-23	Prehistoric
Prosser Reservoir Open Area	CA-NEV-24	Prehistoric
Prosser Reservoir Open Area	NEV-10	Prehistoric
Prosser Reservoir Open Area	NEV-11	Prehistoric
Prosser Reservoir Open Area	NEV-22	Prehistoric
Prosser Reservoir Open Area	NEV-56	Prehistoric
Prosser Reservoir Open Area	NEV-57	Prehistoric
Prosser Reservoir Open Area	NEV-58	Prehistoric
Prosser Reservoir Open Area	NEV-59	Prehistoric
Prosser Reservoir Open Area	NEV-60	Prehistoric
Prosser Reservoir Open Area	NEV-61	Prehistoric
Prosser Reservoir Open Area	NEV-62	Prehistoric
Prosser Reservoir Open Area	NEV-63	Prehistoric
Prosser Reservoir Open Area	NEV-65	Prehistoric
Prosser Reservoir Open Area	NEV-65	Prehistoric
Prosser Reservoir Open Area	NEV-66	Prehistoric
Prosser Reservoir Open Area	NEV-67	Prehistoric
Prosser Reservoir Open Area	NEV-68	Prehistoric
Prosser Reservoir Open Area	NEV-69	Prehistoric
Prosser Reservoir Open Area	NEV-70	Prehistoric
Prosser Reservoir Open Area	NEV-71	Prehistoric
Stampede Reservoir Open Area	05175700535	Prehistoric
Stampede Reservoir Open Area	05175700540	Prehistoric
Stampede Reservoir Open Area	05175700004/SIE-S44	Prehistoric site listed on the National Register of Historic Places
Stampede Reservoir Open Area	DWR-S-1	Prehistoric
Stampede Reservoir Open Area	SIE-11	Prehistoric
Stampede Reservoir Open Area	SIE-12	Prehistoric
Stampede Reservoir Open Area	SIE-13	Prehistoric
Stampede Reservoir Open Area	SIE-14	Prehistoric
Stampede Reservoir Open Area	SIE-15	Prehistoric
Stampede Reservoir Open Area	SIE-16	Prehistoric
Stampede Reservoir Open Area	SIE-17	Prehistoric
Stampede Reservoir Open Area	SIE-28	Prehistoric antelope corral
SV-P14	05175600571	Prehistoric
SV-P5	05175600574	Historic
TKN-002	05175700332	Historic
TKN-003	05175700564	Multicomponent
TKN-003	05175700563	Prehistoric

Route ID	Resource ID	Resource Type
TKN-J1	05175700206	Historic
TKN-J11	05175700096	Historic
TKN-J11	05175700097	Prehistoric
TKN-J11	05175700354	Prehistoric
TKN-J13	05175700286	Multicomponent
TKN-J13	05175700287	Prehistoric
TKN-J6	05175700374	Prehistoric
TKN-J9	05175700508	Historic
TKN-M2	05175700401	Prehistoric
TKN-M2	05175700734	Prehistoric
TKN-Q1	5175700087	Prehistoric
TKN-Q1	05175700554	Prehistoric
TKS-11	05175700735	Prehistoric
TKS-11	05175700736	Prehistoric
TKS-M9	05175700450	Historic
YRN-002	05175300887	Prehistoric
YRN-004	05175300676	Historic
YRN-007	05175300426	Prehistoric
YRN-008	05175300369	Historic
YRN-1	05175300881	Historic
YRN-2	05175300499	Historic
YRN-2	05175300545	Historic
YRN-2	05175300546	Historic
YRN-4	05175300386	Historic
YRN-509	05175300198	Historic
YRN-509	05175300205	Historic
YRN-7	05175300674	Historic
YRN-M1	05175300389	Prehistoric
YRN-M1	05175300390	Prehistoric
YRN-M1	05175300392	Prehistoric
YRN-M1	05175300394	Multicomponent
YRN-M1	05175300882	Prehistoric
YRN-M1	05175300885	Prehistoric
YRN-M2	05175300671	Historic
YRN-M2	05175300675	Historic
YRN-M2	05175300890	Historic
YRN-M3A	05175300669	Historic
YRS-F1	05175300888	Historic
YRS-SF5	0175500272	Historic

Environmental Consequences

Effects Analysis Methodology

Assumptions specific to cultural resources

Roads, trails, and open areas un-authorized for motorized use 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 travel. The effects analysis focused on the potential for any effect associated with current or increased use levels.

Site specific observations (monitoring) were completed as required under the *Motorized PA*. Each site was monitored for current conditions and to document any existing impacts and potential effects from motorized and non-motorized recreation.

Measurement Indicator and Rationale

All cultural resources are considered *historic properties* unless they already have been determined *not eligible* in consultation with the State Historic Preservation Officer (SHPO). When assessing direct, indirect, and cumulative effects on historic properties, assessments were made based on the National Register of Historic Places. The National Register of Historic Places contains four criteria and seven levels of integrity for this assessment. The four criteria are:

1. Is the property **associated with events** that have made a significant contribution to the broad patterns of our history; or
2. Is the property **associated with the lives of persons** significant in our past; or
3. Does the property embody **the distinctive characteristics** of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
4. Will the property **yielded, or likely yield, information** important in prehistory or history.

Of these four criteria, only 3 and 4 are applicable to this project.

The seven levels of integrity are:

1. Location
2. Design
3. Setting
4. Materials
5. Workmanship
6. Feeling
7. Association

The **Motorized PA** allows for the addition of roads and motorized trails to the National Forest Transportation System within historic properties, if there is no additional impact to the property expected through continued motorized use of the route. Information about existing effects was used in determining

whether continued use by motor vehicles would cause any additional effects. In addition, sites may have ongoing effects not related to motorized use.

When assessing effects under Section 106 of the NHPA, an undertaking can have:

- No effect
- No adverse effect
- An adverse effect

An adverse effect on a historic property can occur when an undertaking **a) directly** or **b) indirectly** alters its important values and is measured by the degree to which it diminishes its integrity.

Direct effects are/will be caused by motorized vehicle uses/or the consequences of such use, including physical damage resulting in or from erosion, down-cutting, rutting, or displacement or damage to cultural features.

Indirect effects are associated with motorized vehicle uses but occur outside designated routes and areas, such as adjacent dispersed camping areas or areas where travel off of designated routes or areas may occur. The proximity of sensitive cultural resources (i.e., rock art) to designated routes is important when determining where resources could be susceptible to greater threats or risks. Indirect effects could include those listed for direct effects, but also include destructive actions like vandalism and looting.

The integrity measures were used to characterize the nature of any potential effects, whether they are direct, indirect or cumulative; and their severity, whether they are negligible, minor, moderate, or major. The degree to which historic property values are diminished will be used to measure the direct, indirect and cumulative effects of motorized use on the NFTS.

There can be a direct or indirect effect on historic properties if use by motorized vehicles diminishes the values of a historic property. If there are effects, mitigation measures can be used to maintain and protect the site values. The mitigation measures are specified in Appendix A (Road Cards). Use of these mitigation measures should result in a no adverse effect to historic properties. Where there are ambiguous effects, a provision for monitoring is also specified in Appendix A to identify if future management actions would be needed to reduce or eliminate effects.

Effects of the Alternatives on Heritage Resources

The roads, trails and areas being considered for addition the National Forest Transportation System in the alternatives already exist on-the-ground. Although they are currently being used by motorized vehicles, such use is not authorized. Since the routes already exist, some degree of impact has already occurred to the historic properties in the Area of Potential Effect. During the field work in support of this proposed undertaking, past effects from motorized vehicles and other activities (non-motorized effects) were observed and described. The inventory and monitoring observations are summarized in Heritage Resource Report TNF02151/R2007051700062.

Based on the inventory and monitoring, effects were determined for each route and associated site. Depending on the number of new routes added to the NFTS under each alternative, the total number of sites affected varies. The results are shown in Table. 3.05-3. Under all of the action alternatives, the reduced motor vehicle access will lessen the effects associated with motorized vehicle use on roads and trails.

Table 3.05-3. Site Specific Motorized Effects on Heritage Resources by Alternative

Route ID	Site Number	Effect	Type/Severity	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
25-9_p	05175300469	Trail	Direct/Minor	X				X	X	
39-5_p	05175300217	Roads	Direct/Moderate	X						
39-5_p	05175300342	None	None	X						
491-3_1	05175300337	None	None	X				X	X	
491-3_2	05175300216	Road	Direct/Minor	X				X	X	
ARM-5	05175400124	None	None	X	X		X	X	X	X
ARN-001	05175500317	Road	Direct/Minor	X						
Eureka Diggings	05175300004	Open area in tailings	Direct/Major	X	X					
Eureka Diggings	05175300023	None	None	X	X					
Eureka Diggings	05175300230	None	None	X	X					
H11E10	05175300696	Road	Direct/Minor	X				X		
H1-2	05175700297	Road	Direct/Minor	X				X		
H25-11-3	05175300031	Road	Direct/Minor	X				X		
H261-8	05175700558	Road	Direct/Minor	X				X		
H261-8	05175700563	Road	Direct/Minor	X				X		
H27-19	05175300032	Road	Direct/Minor	X				X		
H293-4-4	05175300385	Road	Direct/Minor	X				X		
H293-4-4	05175300637	Road	Direct/Minor	X				X		
H301-6	05175300176	Road	Direct/Minor	X				X		
H301-6	05175300188	Road	Direct/Minor	X				X		
H3-4-4	05175700148	Road	Direct/Minor	X				X		
H50-12-3-1	05175500035	Road	Direct/Minor	X				X		
H54-9	05175600283	Road	Direct/Minor	X				X		
H54-9	05175600317	Road	Direct/Minor	X				X		
H54-9	05175600341	Road	Direct/Minor	X				X		
H652-5-5	05175500481	Road	Direct/Minor	X				X		
H833-10	05175500458	Road	Direct/Minor	X				X		
H833-10	05175500459	Road	Direct/Minor	X				X		
H88-44	05175400215	Road	Direct/Minor	X				X		
H889-28	05175700088	Road	Direct/Minor	X				X		
H889-3-18-5	05175700563	Road	Direct/Minor	X				X		

Route ID	Site Number	Effect	Type/Severity	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
H889-3-30-10	05175700304	Road	Direct/Minor	X				X		
H889-3-30-10	05175700307	Road	Direct/Minor	X				X		
H889-3-30-5	05175700303	Road	Direct/Minor	X				X		
H889-8	05175700395	Road	Direct/Minor	X				X		
H889-8	05175700401	Road	Direct/Minor	X				X		
H894-5-1	05175700240	Road	Direct/Minor	X				X		
N25-1-1	05175300347	Road	Direct/Minor	X				X		
N25-1-1	05175300348	Road	Direct/Minor	X				X		
N25-2 and N25-2-3	0175300454	Road	Direct/Minor	X				X		
N25-6-1	05175300356	Road	Direct/Minor	X				X		
N25-7	05175300034	Road	Direct/Minor	X				X		
N261-8-15-2	05175700563	Road	Direct/Minor	X				X		
N27-3	05175300514	Road	Direct/Minor	X				X		
N27-5	05175300446	Road	Direct/Minor	X				X		
N39-5	05175300217	Road	Direct/Minor	X				X		
N43-6-2	05175400368	Road	Direct/Minor	X				X		
N860-20-1	05175600426	Road	Direct/Minor	X				X		
N860-20-1	05175700540	Road	Direct/Minor	X				X		
N886-14-10	05175700577	Road	Direct/Minor	X				X		
N886-1-5	05175700009	Road	Direct/Minor	X				X		
N886-1-5	05175700409	Road	Direct/Minor	X				X		
N886-18-10	05175700447	Road	Direct/Minor	X				X		
N886-18-10	05175700529	Road	Direct/Minor	X				X		
N889-3-30-10	05175700304	Road	Direct/Minor	X				X		
N890-14-5	05175700511	Road	Direct/Minor	X				X		
N96-34-2-6	05175400325	Road	Direct/Minor	X				X		
open area Boca Reservoir	05175700241	None	None	X	X					
open area Boca Reservoir	05175700303	Road	Direct/Minor	X	X					
open area Boca Reservoir	05175700305	Road	Direct/Minor	X	X					
open area Boca Reservoir	05175700307	Road	Direct/Minor	X	X					
open area Boca Reservoir	05175700175/CA-NEV-82	Roads	Direct/Moderate	X	X					
open area Boca Reservoir	05175700240/CA-NEV-81	Roads	Direct/Moderate	X	X					

Route ID	Site Number	Effect	Type/Severity	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
open area Boca Reservoir	CA-NEV-26	None	None	X	X					
open area Prosser Reservoir	05175700460	None	None	X	X					
open area Prosser Reservoir	05175700609	Road	Direct/Minor	X	X					
open area Prosser Reservoir	05175700608/CA-NEV-64	Road	Direct/Minor	X	X					
open area Prosser Reservoir	CA-NEV-23	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	CA-NEV-24	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-10	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-11	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-22	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-56	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-57	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-58	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-59	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-60	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-61	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-62	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-63	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-65	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-66	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-67	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-68	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-69	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-70	Vehicular tracks	Direct/Minor	X	X					
open area Prosser Reservoir	NEV-71	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	05175700535	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	05175700540	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	05175700004/SIE-S44	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	DWR-S-1	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	SIE-11	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	SIE-12	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	SIE-13	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	SIE-14	Vehicular tracks	Direct/Minor	X	X					

Route ID	Site Number	Effect	Type/Severity	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
open area Stampede Reservoir	SIE-15	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	SIE-16	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	SIE-17	Vehicular tracks	Direct/Minor	X	X					
open area Stampede Reservoir	SIE-28	Vehicular tracks	Direct/Minor	X	X					
SV-P14	05175600571	Road	Direct/Minor	X	X		X	X	X	X
SV-P5	05175600574	Road	Direct/Minor	X	X			X	X	X
TKN-002	05175700332	Road	Direct/Minor	X						
TKN-003	05175700563	Road	Direct/Minor	X	X			X	X	
TKN-003	05175700564	Road	Direct/Minor	X	X			X	X	
TKN-J1	05175700206	Road	Direct/Minor	X						
TKN-J11	05175700096	None	None	X	X			X	X	
TKN-J11	05175700097	Road	None	X	X			X	X	
TKN-J11	05175700354	None	None	X	X			X	X	
TKN-J13	05175700286	Road	Direct/Moderate	X	X		X	X	X	X
TKN-J13	05175700287	Road	Direct/Moderate	X	X		X	X	X	X
TKN-J6	05175700374	Road	Direct/Minor	X	X		X	X	X	X
TKN-J9	05175700508	None	None	X	X		X	X	X	X
TKN-M2	05175700401	Trail	Direct/Moderate	X	X			X	X	
TKN-M2	05175700734	Trail	Direct/Moderate	X	X			X	X	
TKN-Q1	05175700087	Road	Direct/Minor	X	X			X	X	
TKN-Q1	05175700554	None	None	X	X			X	X	
TKS-11	05175700735	None	None	X	X			X	X	X
TKS-11	05175700736	None	None	X	X			X	X	X
TKS-M9	05175700450	None	None	X	X		X	X	X	X
YRN-002	05175300887	Road erosion	Direct/Minor	X						
YRN-004	05175300676	Road erosion	Direct/Minor	X	X			X		
YRN-007	05175300426	None	None	X	X			X	X	
YRN-008	05175300369	OHV tracks, rutting	Direct/Moderate	X	X			X	X	
YRN-1	05175300881	Road erosion	Direct/Minor	X	X			X	X	X
YRN-2	05175300499	Road erosion	Direct/Minor	X	X			X	X	X
YRN-2	05175300545	Road	Direct/Minor	X	X			X	X	X
YRN-2	05175300546	None	None	X	X			X	X	X

Route ID	Site Number	Effect	Type/Severity	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
YRN-4	05175300386	Road erosion	Direct/Minor	X	X			X	X	X
YRN-509	05175300198	Spur road	Direct/Minor	X	X			X	X	
YRN-509	05175300205	Spur road	Direct/Minor	X	X			X	X	
YRN-7	05175300674	Road erosion	Direct/Minor	X	X			X	X	X
YRN-M1	05175300389	None	None	X						
YRN-M1	05175300390	Trail	Direct/Minor	X						
YRN-M1	05175300392	Trail	None	X						
YRN-M1	05175300394	None	None	X						
YRN-M1	05175300882	Trail	Direct/Minor	X						
YRN-M1	05175300885	Trail	Direct/Minor	X						
YRN-M2	05175300671	Trail-erosion from FS System Road 25-23-1-2	Direct/Moderate	X	X			X		
YRN-M2	05175300675	Trail	Direct/Minor	X	X			X		
YRN-M2	05175300890	None	None	X	X			X		
YRN-M3A	05175300669	Trail erosion, damage to features	Direct/Moderate	X						
YRS-F1	05175300888	Multiple roads	Direct/Major	X	X			X	X	X
YRS-SF5	05175500272	None	None	X	X		X	X	X	X
Unauthorized routes not included in any alternative	175 additional sites									

Table 3.05-4. Summary Comparison of Effect, Type, and Severity on Heritage Resources

Effect	Type/Severity	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Open Area/Multiple Roads	Direct/Major	2	2	0	0	1	1	1
Roads/Trails/Erosion	Direct/Moderate	10	8	0	2	6	5	2
Road/Trail/Tracks	Direct/Minor	112	56	0	2	66	17	10
None	None	22	17	0	4	14	13	7
	Total	**146**	**83**	**0**	**8**	**87**	**36**	**20**
Cross Country Travel		Continues	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited

Cross Country Travel: Alternative 1, the no action alternative, has the greatest direct and indirect effects on cultural resources since it continues the pattern of unrestricted cross country travel, resulting in random and unmanageable impacts to cultural resources, resulting in the loss of integrity and NRHP values.

All of the action alternatives prohibit cross country travel on 800,000 acres. This prohibition will reduce the potential for adverse impacts to heritage resources from motorized vehicles by reducing the number of miles available for motorized use. The prohibition of cross country travel would have a beneficial effect on cultural resources throughout the Forest. In the short and long term; it would curtail on-going effects and reduce the risk and threat to cultural resource values. All future permitted or other authorized vehicle travel off designated roads, trails and areas will be subject to NHPA Section 106 compliance and potential effects to cultural and historic properties would be identified at that time.

Additions to the National Forest Transportation System: Table 3.05-4 summarizes the effects on heritage resources by alternative. Under Alternatives 2, 4, 5, 6, and 7, all routes being added to the National Forest Transportation System that are having direct major or moderate effects to sites have mitigation measures outlined in Appendix A (Road Cards). These protection measures are listed as Standard Resource Protection Measures in the Motorized PA. They are designed to maintain the values at each site. Alternatives which add routes to the National Forest Transportation system still have the potential to impact sites as a result of motorized use. Therefore, those alternatives which recommend the most number of routes and miles have the greatest potential impact to sites. All of the action alternatives reduce the potential for adverse impacts to heritage resources from motorized vehicles by reducing the number of miles available for motorized use.

Under Alternative 2, there are 2 sites with direct major effects. Effects at one site (0517530004) are from the tailings area being used as an open area and the other is a site (05175300888) located along the Fordyce Jeep Trail where there are multiple short motorized trail spurs which come off the existing National Forest System motorized trail to access dispersed camping sites. These short spurs receive heavy use during a brief time of the year. Both sites are currently being evaluated for inclusion in the National Register of Historic Places. There are 8 sites having direct moderate effects. At these sites, there are moderate levels of erosion within the existing road or trail prisms. Implementing road maintenance and erosion control measures will halt these effects. Additionally, barricades and signage will be implemented at these sites to prohibit motorized vehicles into the sites. Specific recommendations are listed in Appendix A (Road Cards). Alternative 2 also maintains motorized use below the high water line at Boca,

Prosser, and Stampede Reservoirs. Motorized access to shoreline below the high water line at these reservoirs has direct but minor impacts to the heritage sites (one of which is a National Register listed site). The more severe effects to these sites are not associated with motorized vehicles (non-motorized impacts); they are associated with wave action, deflation, and boating access. These factors are having moderate to major effects on these sites as compared to the minor effect resulting from motorized use. All of the other action alternatives close these reservoirs to motorized vehicles, but the effects resulting from wave action, wind action and boating access will continue. Fifty-six (56) sites in this alternative were noted has having direct minor effects. Monitoring is recommended to determine if mitigation measures will be needed in the future.

There are no historic properties associated with Alternative 3.

Alternative 4 has the least effects to heritage resources as only 4 sites have direct moderate or minor effects.

Aside from Alternative 1 (no action alternative), Alternative 5 has the most sites associated with the proposed additions to the National Forest Transportation System. One site (05175300888), also included in Alternative 2, 6, and 7, has direct major effects. Again, this site is currently being evaluated for inclusion in the National Register of Historic Places. Six (6) sites have direct moderate effects and 66 were classified as having direct minor effects.

Alternatives 6 and 7 reduce the number of sites associated with proposed additions to the National Forest Transportation System. There are 36 sites in Alternative 6 and 20 in Alternative 7. As noted in the above, one site has direct major effects. However, like Alternative 5, there are few sites (5 for Alternative 6 and 2 for Alternative 7) with direct moderate effects. The most significant difference is with sites having direct minor effects (17 under Alternative 6 and 10 for Alternative 7).

Changes to Class of Vehicle and/or Season of Use: Neither action is 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 NFS roads. Allowing or prohibiting non-highway legal vehicle use will have no direct, indirect, or cumulative effect on cultural resources.

Cumulative Effects: The impacts of the alternatives when combined with the following past, present, and foreseeable future actions and events constitute the cumulative effects. However, each alternative, when added to past, present, and reasonably foreseeable future actions is not expected to cumulatively lead to increased impacts to cultural resources/historic properties. Under the no action alternative, adverse impacts are expected to be higher than under the action alternatives. All of the action alternatives will reduce the potential effects to cultural resources due to the prohibition of cross country travel and the reduction in motorized roads and trails available for public use.. Unregulated cross country travel has the greatest potential for creating adverse impacts to cultural resources.

Prior to the 1974 Forest and Rangeland Renewable Resources Planning Act (RPA), effects to heritage resources were not considered during project planning or implementation. Consequently, cumulative impacts of varying degrees occurred within the project area from various land management activities including mining, logging, road construction, recreation development, dam construction, and hydroelectric development to name a few. Stochastic effects, such as natural environmental processes and

unrestricted land uses, have also contributed to effects to heritage resources within the project area. These include dispersed recreation, looting and vandalism by the public, unregulated OHV use, illegal mountain bike trail construction, mining, previous road and trail construction and existing road and trail conditions, wildfires, erosion, and exposure to the elements.

Additionally, the majority of cultural resources have been protected using "flag and avoid" measures during all project activities subsequent to the 1974 RPA, including projects such as timber and fire salvage sales. Unfortunately, this management practice, which is essentially deferred management, has resulted in a high number of recorded archaeological sites that have not been evaluated for inclusion into the National Register of Historic Places resulting in the Forest managing hundreds of sites that may be not eligible for inclusion in the NRHP. All projects listed in Table 3.00-1 *Reasonably Foreseeable Future Actions Considered in Cumulative Effects Analysis* have been or will be subject to NHPA Section 106 compliance and potential effects to cultural and historic properties would be identified at that time following stipulations in the *Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, the California State Historic Preservation Officer, and the Advisory Council for Historic Preservation, Regarding Process for Compliance with Section 106 of the National Historic Preservation Act for undertakings on the National Forests of the Pacific Southwest Region* (Regional PA).

3.06. Plant Communities

Regulatory Framework

Management direction for vegetation (including threatened, endangered, proposed, sensitive plant and fungi species and/or watchlist plants and plant communities) on the TNF can be found in the following documents, filed at the SO office:

- Forest Service Manual and Handbooks (FSM/H 2670 for TEPS plants)
- National Forest Management Act (NFMA)
- Endangered Species Act (ESA)
- National Environmental Policy Act (NEPA)
- Tahoe National Forest Land and Resource Management Plan (LRMP) as amended by the Sierra Nevada Forest Plan Amendment (SNFPA 2001), Final Supplemental Environmental Impact Statement (January 2004). The standards and guidelines in the January 2004 SNFPA record of decision (ROD) are incorporated by reference.
- Species-specific recovery plans which establish population goals for recovery of those species
- Species management plans
- Species management guides or conservation strategies
- Regional forester policy and management direction

In general, Forest Service direction for sensitive plants/fungi species is to:

- Assist States in achieving their goals for conservation of endemic species.
- As part of the NEPA process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.
- Avoid or minimize impacts to species whose viability has been identified as a concern.
- If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.
- Establish management objectives in cooperation with the States when a project on National Forest System (NFS) lands may have a significant effect on sensitive species population numbers or distribution. Establish objectives for Federal candidate species, in cooperation with the USFWS and the States.
- Conduct field surveys for TEPS plant species early enough in project planning process that the project can be designed to conserve or enhance TEPS plants and their habitat (SNFPA ROD page 66, S&G #125).
- Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining fen ecosystems and plant species that depend on these ecosystems (SNFPA ROD page 65, S&G #118).

State and Federal laws, Forest Service direction, and other regulatory direction that is relevant to the management and prevention of noxious weeds include:

- Forest Service Manual (FSM) 2080
- Executive Order 13112 of February 3, 1999.

- Sierra Nevada Forest Plan Amendment (SNFPA) standard and guidelines **(S&Gs)**: The SNFPA (2004) lists 14 S&Gs for management of noxious weeds.

Affected Environment

Background

The plant communities on the Tahoe National Forest (TNF) are made up of a series of vegetation types arranged in dynamic patterns. These vegetative patterns are influenced by the geology of the particular area, the climate, and the types of disturbances that the area has experienced. The TNF plant communities are constantly changing due to the occurrence of such things as: wildfires, ecological succession, climate change, wind, drought, insects, management activities, etc.

As described in the SNFPA (2001), the physical structures that form the TNF and the diversity and number of plant species, have not changed much in the last 2 million years. However, the distribution and associations of plant species have changed significantly over time. The types and acres (SNFPA 2001) of TNF vegetation types are displayed in Table 3.06-1.

The difference between the current distribution and abundance of rare plant (threatened, endangered, proposed, sensitive, and/or watchlist) populations and historic levels is largely unknown (SNFPA 2001). Plant species may be rare due to evolutionary history, basic population ecology, historic or current human activities, or, more likely, a combination of these factors. Human activities may or may not be responsible for the current distribution and abundance of the rare species. However, an important assumption in this analysis is that motorized vehicle use within and adjacent to rare species occurrences have the ability to negatively impact the long-term viability of specific plant and fungi species. In particular, motorized vehicle use can reduce the quality of and/or the amount of habitats that support rare plant and fungi species. Table 3.06-2 displays the number of sensitive species occurrences known to occur on TNF system lands.

In addition to rare plant species, four of the plant communities/ecosystems found in the TNF are impacted by motorized vehicle use and are considered limited in the TNF. In addition, two ecologically important disturbance related processes that are contributed to by motorized vehicle use are also discussed in detail:

- Aquatic/riparian
- Serpentine
- Older forests – all vegetation types but primarily mixed conifer and red fir
- Oak woodlands
- Noxious weed infestation
- Habitat fragmentation

Aquatic/riparian, serpentine, older forest and oak woodland plant communities are made up of several different vegetation types. These plant communities are of concern because of the amount of the plant community available, the condition of the remaining plant communities, and/or because the plant community provides habitat for a number of threatened, endangered, proposed, sensitive, (TEPS) and/or watchlist plants. The presence of and expansion of weeds into Sierra Nevada ecosystems is a serious

threat to these ecosystems. In addition, the connectivity of various ecosystems is very important for plant and wildlife species.

Currently, the TNF has roughly 717,900 acres of land where cross country travel is not prohibited. Many of these acres could not be accessed by motorized vehicles due to terrain and vegetation density.

Table 3.06-1. Acres of Vegetation Type on the TNF

Vegetation type	Acres
Unvegetated (includes rock outcrops, water, urban and agricultural)	50,159
Grassland (does not include grassy patches in the conifer zones)	34
Shrublands (does not include brush patches embedded in the conifer zone)	165,409
Black oak	50,306
Live oak	9,518
Riparian hardwoods (primarily aspen, willow and cottonwood species)	3,559
Mixed conifer	164,693
Ponderosa pine	11,645
Red fir	127,388
Westside white fir	174,455

Vascular plants

The diversity of topography, geology, and elevation on the TNF has combined to create conditions that support a diverse flora. For example, the TNF is known to contain about 30 percent of the 5,000 native vascular plant species known to occur in the state of California. In Nevada County alone, there are over 1,490 native vascular plant species (Beedy and Brossard 2002). The TNF sensitive species list currently contains 30 rare vascular plants that are known to occur on or near TNF system lands. They include: *Arabis rigidissima* var. *demota*, *Astragalus webberi*, *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium lunaria*, *Botrychium minganense*, *Botrychium montanum*, *Calochortus clavatus* var. *avius*, *Clarkia biloba* ssp. *Brandegeae*, *Cypripedium fasciculatum*, *Cypripedium montanum*, *Epilobium howellii*, *Erigeron miser*, *Eriogonum umbellatum* var. *torreyanum*, *Fritillaria eastwoodiae*, *Ivesia aperta* var. *aperta*, *Ivesia aperta* var. *canina*, *Ivesia sericoleuca*, *Ivesia webberi*, *Lewisia cantelovii*, *Lewisia kelloggii* ssp. *hutchisonii*, *Lewisia kelloggii* ssp. *kelloggii*, *Lewisia longipetala*, *Lewisia serrata*, *Lupinus dalesiae*, *Monardella follettii*, *Penstemon personatus*, *Phacelia stebbinsii*, *Pyrrocoma lucida*, and *Tauschia howellii*. The TNF also has 21 vascular plants on its watchlist.

Vascular plants are the largest and most dominant organisms on the TNF. For example, trees within old forest ecosystems can reach over 250 feet tall and have life spans of over 1,000 years. Vascular plants are an essential part of the ecosystems represented on the TNF. As described in the SNFPA (2001), vascular plants create the structure of the forest and function as the primary producers, capturing sunlight through photosynthesis and converting it to food consumed by animals and fungi. They provide substrate and habitat for other organisms; influence microclimate (such as sunlight, humidity, and temperature); and provide forage, hiding, and thermal cover for vertebrate and invertebrate species. They produce litter fall that contributes to organic matter and soil development. Some species form symbiotic relationships with fungi and other vascular plants.

Bryophytes, Lichens and Fungi

The TNF sensitive species list currently contains 6 rare mosses, 3 rare fungi and an aquatic lichen. The TNF watchlist tracks *Sphagnum* moss species. As identified in the SNFPA (2001), there is a great need for

systematic collecting and taxonomic study of Sierra Nevada bryophytes, lichens and fungi. These organisms are recognized as having important ecosystem function but they have not received intensive study and are some of the least surveyed species in the forest.

Bryophytes

Bryophytes are mosses, liverworts, and hornworts (non-vascular green plants). There are 6 rare mosses known to occur on TNF system lands and/or adjacent to them. They include: *Bruchia bolanderi*, *Fissidens aphelotaxifolius*, *Helodium blandowii*, *Meesia triquetra*, *Meesia uliginosa*, and *Mielichhoferia elongata*. These mosses are habitat specific either occurring in aquatic/riparian areas or in rock with copper/heavy metals (*Mielichhoferia elongata*). They may have crucial roles in the hydrologic cycle and in the ecology of meadows and riparian areas. The TNF does not have a comprehensive moss flora.

In addition, *Meesia longiseta* and *Sphagnum* moss species are included on the TNF watchlist. It is possible that *Meesia longiseta* occurs in fens on the TNF but at this time there are no known occurrences of *Meesia longiseta* on the TNF. Several fen habitats on the TNF are known to contain mosses in the genus *Sphagnum*. *Sphagnum* moss is ecologically important in that it prefers to grow in acidic conditions and actually contributes to the acidity by giving off hydrogen ions. In addition, *Sphagnum* moss can absorb more than 90 percent of its dry weight in water, which can be crucial in maintaining hydrological conditions in meadows and fens.

Motorized vehicles impact moss species in several ways. When mosses are run over by vehicles, they do not have an underground root system that can help them recover (compared to vascular plants). In addition, water temperature is important to the photosynthetic ability of mosses. As described in the SNFPA (2001) mosses can photosynthesize effectively at temperatures as low as 33 degrees F (compared to a lower limit of about 50 degrees F for vascular plants). Mosses stop photosynthesizing effectively at an upper limit of about 77 degrees F (in contrast to vascular plants, some of which can photosynthesize at temperatures of up to 100 degrees F). When moss layers are disturbed by vehicles, it is possible that water temperatures can go up due to hydrologic disruption.

Lichens

Lichens are a combination of two different types of organisms (fungi and algae) growing together in a symbiotic relationship. The rare lichen, *Hydrothyria venosa*, is known to occur on or near TNF system lands. There are no lichens on the TNF watchlist. Lichens occur in all types of habitats, and frequently show specific substrate preferences. They are important in soil formation. Information regarding lichen distributions in the Sierra Nevada and on the TNF is incomplete. There is a great need for further study of lichen ecology and distribution in the Sierra Nevada.

Motorized vehicle use affects lichens primarily through damage to the organisms themselves and by damaging the habitat where they are growing. Threats to *Hydrothyria venosa* include damage to the habitat component of clear water from introduction of sediment and possibly petroleum products.

Fungi

Fungi are organisms without chlorophyll that digest other organic matter. There are 3 rare fungi known to occur on or adjacent to TNF system lands. They include: *Cudonia monticola*, *Dendrocollybia racemosa*, and *Phaeocollybia olivacea*. There are no fungi on the TNF watchlist. Information regarding fungal distributions and ecology on the TNF is incomplete. However, it is known that fungi break down organic material to make inorganic nutrients available for use by other organisms. In addition, many fungi are considered essential food sources for animals. Others play important roles as mycorrhizal symbionts for vascular plants where nutrients are exchanged between a fungus and the roots of a plant.

Motorized vehicle use affects fungi primarily through damage to the underground portion of the fungus through compaction and/or displacement of soil, and/or damage to and/or displacement of host plants. Mycorrhizal relationships between fungi and vascular plants are essential for plant growth and survival. Motorized vehicles are recognized as carriers of non-native invasive plants (weeds) that can displace native vegetation.

Motorized vehicle use is also known to damage biotic (living) soil crusts. These soil crusts are formed from a relationship between the top few millimeters of the soil, and an assortment of lichens, mosses, liverworts, cyanobacteria, algae, fungi, and bacteria. Motorized vehicles break through these crusts exposing the soil to wind and/or water erosion.

Table 3.06-2. Number of Sensitive Species Occurrences Known to Occur on TNF System Lands

Scientific Name	Known Occurrences on TNF system lands	Estimated number of plants
Arabis rigidissima var. *demota*	None	0
Astragalus webberi	None	0
Botrychium ascendens	4	Less than 80
Botrychium crenulatum	8	Less than 500
Botrychium lunaria	None	0
Botrychium minganense	None	0
Botrychium montanum	None	0
Bruchia bolanderi	4	Number of moss plants not estimated
Calochortus clavatus var. *avius*	None	None
Clarkia biloba ssp. *Brandegeae*	4	Varies by year – this is an annual plant – less than 4,000
Cudonia monticola	1	Not estimated – most of the fungus is underground.
Cypripedium fasciculatum	7	Less than 500
Cypripedium montanum	None	None
Dendrocollybia racemosa	1	Not estimated
Epilobium howellii	4	Less than 1,500
Erigeron miser	14	8,100
Eriogonum umbellatum var. *torreyanum*	11	7,000
Fissidens aphelotaxifolius	None	Number of moss plants not estimated
Fritillaria eastwoodiae	7	Less than 1,000
Helodium blandowii	None	Number of moss plants not estimated

Scientific Name	Known Occurrences on TNF system lands	Estimated number of plants
Hydrothyria venosa	None	Number of lichen not estimated
Ivesia aperta var. *aperta*	5	Less than 5,000
Ivesia aperta var. *canina*	None	None
Ivesia sericoleuca	28	50,000
Ivesia webberi	None	None
Lewisia cantelovii	16	Less than 5,000
Lewisia kelloggii ssp. *hutchisonii*	6	Less than 1,000
Lewisia kelloggii ssp. *kelloggii*	None	None
Lewisia longipetala	4	Less than 1,000
Lewisia serrata	5	Less than 500
Lupinus dalesiae	2	Less than 500
Meesia triquetra	12	Number of moss plants not estimated.
Meesia uliginosa	17	Number of moss plants not estimated.
Mielichhoferia elongata	None	Number of moss plants not estimated
Monardella follettii	None	None
Penstemon personatus	2	Less than 1,000
Phacelia stebbinsii	19	Varies by year – this is an annual plant
Phaeocollybia olivacea	2	Not estimated – most of the fungus is underground.
Pyrrocoma lucida	12	Less than 25,000
Tauschia howellii	2	Less than 5,000

Plant Community Groups

Background: The following discussion groups TNF rare plants and fungi by the general types of habitats where they grow and/or places them into a non-specific plant community group. The plant community/ habitat grouping approach is not all inclusive. Important habitat elements necessary to the viability of a particular species may be missed. However, this grouping provides a rough approximation of the type of habitat each species needs and allows an evaluation of how the potential habitat is impacted by motorized vehicle use. Motorized trails un-authorized for motorized use and NFTS roads and trails may or may not have sensitive and/or watchlist species growing within or adjacent to them. Several sensitive and watchlist plant and plant community occurrences are known to occur within and/or near NFTS roads and trails.

Mitigation measures specified in Appendix A will be implemented in all of the Action Alternatives. These mitigation measures will provide benefits to sensitive and watchlist species and other native vegetation. Motorized trails un-authorized for motorized use with serious and adverse erosion problems will not be available for use until those erosion problems are mitigated. Regardless of the alternative selected, native vegetation will be at risk of being negatively impacted by motorized vehicle use until erosion from roads/trails/areas is reduced and/or eliminated. Negative impacts to native vegetation are not considered significant unless those impacts are reducing the viability of a species or a plant community. This analysis therefore focuses on impacts to rare plant species and plant communities. Surveys will be completed during the field season of 2008.

Revegetation of motorized trails un-authorized for motorized use: The amount of time necessary for a motorized trail un-authorized for motorized use to revegetate is a concern primarily due to possible sediment loss through erosion. The appearance of native vegetation in a disturbed area is considered one of the first visual signs of ecosystem recovery (Switalski et al. 2004). Vegetative recovery of sites is considered acceptable once an herbaceous understory of native vegetation is achieved (Gibson et al. 2000). Studies of the length of time it takes a disturbed area to achieve vegetative recovery indicate that the amount of time varies, and that extrapolation of the time frames from one site to another require an accounting of site-specific historical and environmental factors (ibid). In addition, the limiting factors of the disturbed area (e.g. seed availability, plant recruitment and survival, and soil compaction) need to be defined (Roovers et al. 2005).

Rare plants and plant communities may continue to be negatively impacted by motorized trails un-authorized for motorized use for a period of time even after the motorized use is removed if erosion from the motorized trail is not reduced and/or eliminated. Continued use of motorized trails un-authorized for motorized use that are in need of erosion control (by foot, mountain bike and horse traffic) may also prohibit vegetative recovery. Native vegetative cover protects against erosion and maintains infiltration capacity of the soil (Switalski et al. 2004). Surveys of motorized trails un-authorized for motorized use (and those NFTS roads and trails used to access them) documented that most showed some level of erosion. Therefore, it is important to estimate how long it might take motorized trails un-authorized for motorized use to recover vegetatively once the motorized vehicle use is removed.

It is anticipated that some of the motorized trails un-authorized for motorized use will not recover without restoration actions. These motorized trails un-authorized for motorized use will be restored by the TNF as budgets and personnel are available. Some motorized trails un-authorized for motorized use may be proposed for addition to the NFTS at a later date after conducting NEPA and implementing mitigations to reduce and/or eliminate existing resource damage. Other motorized trails un-authorized for motorized use may be used for non-motorized recreation. Still others will be left alone and they will revegetate without restoration actions. All of these scenarios add to or reduce impacts to native vegetation. As stated above, it is recognized that non-motorized recreational use may also negatively impact native vegetation. However, motorized vehicle use is recognized as more damaging to vegetation than pedestrians (USDA et al. 1998). In addition, the rate of vegetative recovery of any motorized trails un-authorized for motorized use will vary from site to site based on the soil type, amount and type of vegetative cover at the site, topography of the area disturbed, and intensity of the motorized vehicle use (USDA et al. 1998). The ecological effects of motorized vehicle use can extend substantial distances from the road in terrestrial ecosystems (Trombulak and Frissell 2000). Motorized vehicle use can injure organisms adjacent to them and alter physical conditions beneath them. They change soil density, temperature, soil water content, light levels, dust, surface waters, patterns or runoff and sedimentation. They can also add heavy metals (especially lead), salts, organic molecules, ozone, and nutrients to adjacent environments (ibid).

Aquatic/Riparian Plant Communities

Riparian vegetation is found near water sources at all elevations, while aquatic vegetation is found within the water. The SNFPA (2004) identified aquatic/riparian ecosystems as special aquatic features and

defined them as small, irregularly distributed aquatic/riparian habitats. These ecosystems have significantly greater biodiversity than adjacent uplands (Kondolf et al. 1996), providing habitat for both aquatic and terrestrial plant and animal species. They are a critical component of biodiversity within the arid lands of the western United States and their importance is amplified by the small amount of land they occupy (Caicco 1998, Goebel et al. 2003). These ecosystems are also important for rare or endemic plant and animal species including rare or endemic invertebrate species (Erman 1996, Erman and Erman 1990).

Small riparian ecosystems (streams and wetlands) are considered headwater systems. Headwater systems benefit humans by mitigating flooding, maintaining water quality and quantity, recycling nutrients, and providing habitat for plants and animals (Meyer et al 2003). The benefits that humans receive from the natural functioning of headwater systems are called ecosystem services. Intact physical and biological characteristics of small streams and wetlands provide natural flood control, recharge groundwater, trap sediments and pollution from fertilizers, recycle nutrients, create/maintain biological diversity, and sustain the biological productivity of downstream rivers, lakes and estuaries. Seasonal and perennial riparian and aquatic ecosystems provide these ecosystem services. Human disturbances such as extensive motorized vehicle use within headwater systems can result in water pollution, stream filling, and/or the introduction of weeds and other exotic species, can diminish the biological diversity of the systems, and affect the downstream rivers and streams (ibid). Changes to vegetation or hydrology, water pollution, or the introduction of weeds can have profound effects on biota living in headwaters (ibid).

Most estimates indicate that more than 50 percent of the world's aquatic/riparian plant communities (wetlands) may have been altered, degraded or lost in the last 150 years through a wide range of human activities (O'Connell 2003). Aquatic/riparian habitats are believed to be two of the most altered and impaired habitats of the Sierra Nevada (California Wildlife Action Plan). Aquatic/riparian plant communities in the Sierra Nevada have been directly removed or have had their functions impaired by gold mining, gravel mining, hydroelectric development, land clearance and diversions of water for irrigation, land drainage, timber harvest, construction of roads and railroads, urbanization, livestock grazing, and ground water abstraction (Kondolf et al. 1996). Many of the NFTS and motorized trails un-authorized for motorized use cross perennial and/or intermittent streams and/or are located within 100 feet of aquatic/riparian plant communities. The 300 foot zone of influence from an aquatic/riparian plant community with perennial water is called the riparian conservation area (RCA). RCAs are 300 feet wide for aquatic/riparian plant communities with perennial water and 150 feet wide for aquatic/riparian plant communities with intermittent water (SNFPA, 2001). About 459 miles of NFTS motorized roads and trails and motorized trails un-authorized for motorized use are currently located within 100 feet of perennial and/or intermittent water sources on the TNF. The distance of 100 feet from riparian vegetation was chosen as the distance away from a motorized trail that aquatic/riparian vegetation would be indirectly impacted. A distance of 30 feet from aquatic/riparian dependent rare plants was chosen as the distance from a motorized trail where motorized vehicle use could directly impact rare plants.

In this analysis, aquatic/riparian plant communities have been grouped to include: wet meadows, seeps, fens, vernally wet areas, riparian (streamside and lakeside), wet/moist rock cliffs, and spring plant communities. Sensitive species that occur in/are dependent on aquatic/riparian plant communities include: *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium lunaria*, *Botrychium minganense*,

Botrychium montanum, *Bruchia bolanderi*, *Epilobium howellii*, *Fissidens aphelotaxifolius*, *Helodium blandowii*, *Hydrothyria venosa*, *Ivesia aperta* var. *aperta*, *Ivesia aperta* var. *canina*, *Ivesia sericoleuca*, *Ivesia webberi*, *Lewisia cantelovii*, *Lewisia serrata*, *Meesia triquetra*, *Meesia uliginosa*, and *Pyrrocoma lucida*. Watchlist plants and plant communities that are dependent on aquatic/riparian plant communities include: *Darlingtonia californica*, *Drosera anglica*, *Drosera rotundifolia*, *Juncus marginatus* var. *marginatus*, *Mimulus lacinatus*, *Potamogeton filiformis*, *Rhynchospora alba*, *Rhynchospora capitellata*, *Scutellaria galericulata*, *Sphagnum* moss species, *Utricularia minor*, *Veronica cusickii*, special aquatic features, and aspen groves. *Bruchia bolanderi* was found within 30 feet of TKN-J4. *Ivesia sericoleuca* was found within 1 foot of TKN-M2.

Hydrologic alteration is considered one of the biggest threats to sensitive and watchlist species dependent on aquatic/riparian plant communities. Many of the NFTS motorized roads and trails and motorized trails un-authorized for motorized use cross perennial and/or intermittent streams and/or are located within 100 feet of riparian vegetation/water (riparian conservation areas). These crossings are altering the hydrologic conditions of the aquatic/riparian plant community at the crossing and downstream from the crossing. The significance of the hydrologic alterations is dependent on the condition of the soil and vegetation at the crossing. Surveys of crossings showed a wide range of existing conditions. Some are well armored with rock and do not show significant signs of erosion. In other cases, the access to the crossing is too steep and erosion of the stream banks is occurring. Refer to Appendix A (Road Cards) for more information about crossings.

Sensitive and watchlist species dependent on aquatic/riparian plant communities benefit most when the health of the aquatic/riparian ecosystem is maintained or improved. Motorized vehicle use negatively impacts these plant communities by changing the pattern of water flow, reducing vegetative cover, compacting soil, causing erosion, depositing petroleum products/sediment thereby reducing water quality, and introducing invasive non-native plants (weeds).

Riparian vegetative recovery: Native riparian vegetation is adept at recovering from disturbance such as motorized vehicle use as long as the soil is healthy (healthy soil is not compacted or lost through erosion) and the hydrology of the disturbed area is not severely modified. However, each riparian site is different - for example, each stream has a unique combination of channel morphology, streamside vegetation, hydrology, geology, and soils. Therefore the recovery rates of riparian vegetation will vary. Motorized trails un-authorized for motorized use that located adjacent to streams and groundwater discharge areas (seeps and springs) will be susceptible to excessive wetness and periodic flooding (Leung and Marion 1996) and may continue to erode even after the motorized use is removed. The presence of weeds indicates a degrading ecosystem (Thompson et al 1998). Motorized trails un-authorized for motorized use with extensive weed infestations may not recover vegetatively.

Light use: If the motorized vehicle disturbance was light (bare soil was not created/is limited, the motorized trail is already revegetating, and/or streambanks and floodplains were not significantly altered), vegetative recovery will occur rapidly (1 to 2 years based on personal observations) since the roots of the riparian vegetation will still be intact. Native riparian tree and shrub species have deep rooted, soil binding root systems. If native tree and shrub root systems are intact, species such as white or mountain alder (*Alnus rhombifolia* and *A. tenuifolia*) will sprout from the root crown and grow throughout the first

growing season after the disturbance. Native rhizomatous riparian species such as sedges (*Carex* species) will also continue to grow and provide soil cover if their root systems have not been significantly disturbed.

Heavy use: Heavily used riparian areas will have reduced infiltration due to soil compaction, and subsequent surface runoff; reduced and/or eliminated vegetative cover; and the streams and floodplains may have been physically modified. If restoration actions are not taken, erosion may continue and worsen dependent on many factors such as storm and high peak runoff events. In the case of riparian vegetation associated with streams, where a channel is beginning a cycle of erosion, native riparian vegetation seed sources may be absent, the channel gradients may be steep and recovery may require decades or longer (Elmore and Beschta 1987). These areas may not recover without restoration efforts and would be high priority restoration project areas.

Riparian vegetation associated with meadows can heal when remedial treatments reverse the downward trend in the following indicators (Zeedyk 1996):

- Incised channel with active headward erosion
- Eroding soil surface marked by sheet, rill or gully erosion, lowered water table and receding capillary zone
- Surface drying with loss of hydric soils
- Declining population of wetland plant species
- Increasing numbers of upland species
- Disappearance of wetland obligate fauna

Restoration of wet meadow areas begins when available soil moisture increases and the duration of moisture availability is extended enough to meet the minimum seasonal growth requirements of locally adapted wetland plants, especially sedges and rushes (Zeedyk 1996). Allowing motorized trails un-authorized for motorized use located within wet meadows to heal themselves is seldom a responsible decision with regard to restoring wetland integrity (Zeedyk 1996). The road or trail surface must be reshaped to allow overland runoff to cross over rather than be captured by the motorized trails un-authorized for motorized use. Simple revegetation is seldom sufficient to assure meadow restoration - structural work is usually required (ibid). This is especially true where the motorized trail un-authorized for motorized use has incised below the meadow surface.

Riparian vegetation recovery in disturbed areas located in fen/spring/seep areas would be similar to what is described above under light and/or heavy use. However, if fen plant communities are heavily disturbed and the hydrology altered, the fen plant community may be converted to a wet meadow plant community.

Intermediate use: In areas that have received intermediate use, the existing condition of riparian vegetation impacted by motorized vehicle roads/trails/areas falls somewhere between being able to recover on its own, and needing extensive restoration work. Riparian vegetation located within 30 feet of motorized trails un-authorized for motorized use will need site specific evaluation to determine what is needed for revegetation, and/or monitoring to determine whether vegetative recovery is occurring. The greater soil moisture in riparian plant communities magnifies the amount of plant and soil damage (Yorks et al 1997).

Serpentine Plant Communities

Serpentines (ultra mafic soils) are looked upon as significant segments of the worldwide fabric of diversity (Kruckeberg 1984). The vegetation growing on serpentine areas can be highly distinctive. Many serpentine areas are sparsely vegetated and dry, while others are relatively productive and support mixed conifer and yellow pine communities. Plants that exist on serpentine soil have adapted to the unusual chemical composition of the soil. Many species have evolved that are specific to serpentine soil (such species are known as endemics). Several endemic serpentine sensitive and watchlist plant species only occur on serpentine soil. Currently there are about 1,660 acres of serpentine soils on TNF system lands that are impacted by motorized vehicle use of NFTS motorized roads/trails/areas and motorized trails un-authorized for motorized use (within 100 feet of the motorized trail). There are 58 miles of NFTS and 35 miles of motorized trail located within serpentine plant communities.

Serpentines are also identified as irreplaceable watershed systems (Kruckeberg 1984). Serpentine outcrops contain highly fractured and faulted metamorphic and igneous ultramafic rock which serves to store water in the water table. Year-around water such as springs, seeps, and other continuous water flow areas are common in these areas (ibid). Even undisturbed serpentine areas may have sheet erosion and mass wasting. However, disturbance severely enhances the erosion potential on serpentines (ibid).

In this analysis, serpentine plant communities include rocks and soils derived from serpentine that contain heavy metals. Serpentine rocks have iron magnesium silicate and impurities of chromium, nickel, and other toxic elements. As these rocks weather, soils develop that are high in magnesium and iron, low in calcium, and toxic to plants that are not specifically adapted to them. Therefore, they contain unique plant communities. Sensitive species that occur on serpentine soils or copper/heavy metal soils include: *Mielichhoferia elongata* and *Monardella follettii*. Watchlist species that are dependent on these types of habitats include: *Allium sanbornii* var. *congdonii*, *Allium sanbornii* var. *sanbornii*, *Chlorogalum grandiflorum*, and *Perideridia bacigalupi*. Many serpentine floras in California contain a high degree of endemism (Brooks 1987). TNF serpentines occur primarily along the lower western slopes of the forest (Kruckeberg 1984).

Motorized vehicle use impacts these plant communities by reducing vegetative cover, creating disturbed soils that are subject to erosion, and introducing weeds. Many serpentine habitats are open terrain lacking vegetation (Kruckeberg 1984). In addition to impacting vegetation, motorized vehicle use within serpentine habitats can create health hazards for users since inhaling serpentine dust can introduce asbestos fibers into the lungs (ibid). These habitats are limited (less than 1 percent of the earth) (Brooks 1987).

Serpentine vegetative recovery: Serpentine areas are characterized by critically low levels of most principal plant nutrients, exceptionally high levels of magnesium and iron, and a number of toxic trace elements (Safford et al. 2005). Safford and Harrison (2005) report that very low soil fertility in serpentine soils lead to:

- low rates of plant growth and low levels of community productivity
- thin vegetative cover and large extents of bare ground
- higher ratios of native to exotic species
- a higher component of perennial herbs than the adjacent nonserpentine areas

Human disturbance in serpentine areas such as off-highway vehicle use are generally easy to see because vegetation and soil recovery are very slow (Harrison et al 2006). Revegetation of serpentine areas disturbed by motorized vehicle use may also be dependent on whether topsoil remains in the disturbed area. In one study (Koide and Mooney 1987), revegetation of topsoil plots was much more effective than revegetation efforts on subsoil plots especially in serpentine areas with shallow soils. In another study, older trees harvested on serpentine soils were not replaced by old second growth trees for more than 150 years (Kruckeberg 1984). In addition, the types of plants that are capable of growing on serpentine soils appear to be limited (ibid). Many of the plants that are growing on non serpentine soils located adjacent to serpentine soils do not appear to have the genetic preadaptation to become established on serpentine soils (ibid).

Since even undisturbed serpentine areas are considered erosive, it is expected that revegetation of motorized trails un-authorized for motorized use will be slow especially if the use level was intermediate to heavy and there was a loss of top soil. Even lightly disturbed areas will have increased erosion potential. Therefore, in general terms, vegetative recovery of motorized trails un-authorized for motorized use is not expected in the short term (1 to 5 years) and may not occur in the long term (5 years plus) without restoration efforts.

Older Forest Plant Communities

In this analysis, older forest is described as occurring in the red fir/upper montane forest and mixed-conifer forest. Other vegetation types exist that also have older trees, but mixed conifer and red fir are the primary types of older forest analyzed in this document. For more information about old forests, refer to the SNFPA (2001). There are about 353,631 acres of older forest on TNF system lands, of which 29,900 acres are currently, impacted by NFTS motorized roads/trails/areas and motorized trails un-authorized for motorized use. This acreage number was obtained using about 100 feet on either side of NFTS motorized roads/trails/areas and motorized trails un-authorized for motorized use that pass through vegetation mapped as CWHR 4 and above on NFS lands. There are about 1,088 miles of NFTS and 627 miles of motorized trails un-authorized for motorized use located in older forest plant communities.

Plant and fungi species that are dependent on older forest plant communities rely on shade, protected microclimates, and infrequently disturbed substrates. Because of mycorrhizal associations, these species are intolerant of edge effects that change the temperature, moisture, and other microclimate conditions. Sensitive species dependent on these habitats include: *Cudonia monticola*, *Cypripedium fasciculatum*, *Cypripedium montanum*, *Dendrocollybia racemosa*, and *Phaeocollybia olivacea*. The TNF does not currently have any watchlist species or plant communities dependent on older forests.

Motorized vehicle use impacts older forest plant communities in several ways. The most significant impacts may be to underground mycelia and mycorrhizal networks. Motorized vehicle use disturbs the litter/duff/soil organics, reduces soil shade/moisture, and creates openings. Openings created by motorized trails un-authorized for motorized use may break the mycelial network. Reductions in leaf litter and organic material in soils affects the amount of nutrients and water available to plants dependent on mycorrhizal associations and fungi. Creation of bare soil also increases the risk of weed introduction and spread.

Older Forest vegetative recovery: Guariguata and Dupuy (1997) found evidence of soil compaction in tracks of 3 out of the 4 logging roads studied 12 to 17 years after those roads were abandoned. They estimated recovery of tree basal area in road tracks to take at least 80 years to reach the status found in adjacent logged forest and that species richness could take even longer to recover. However, in this document, vegetative recovery is described as the amount of time to re-establish the native forb layer. The understory species associated with old growth, including those dependent on the litter depth and mycorrhizal fungi of old growth forest floors are known to grow into small openings (Lindh and Muir 2004) such as the width of a route. In the short term (five years or less), native vegetation may establish on motorized tails Un-authorized for motorized use that have little soil compaction. It is likely that motorized trails with moderate to heavy soil compaction (within the wheel tracks) will take more than 5 years to recover vegetatively (develop native forb or shrub cover). In many cases, native shrubs growing along the sides of the motorized trail will lean into the trail. However, the bare soil established by the motorized vehicle will remain unvegetated and subject to erosion.

Oak Woodland Plant Communities

California's oak woodlands are largely privately owned and are estimated to cover about 10 million acres (Ewing et al. in Bartolome and Standiford 1992). They provide shelter and food for wildlife, wood and fuel for humans, and feed for livestock (Jimerson and Carothers 2002). Oak woodlands contain some of the highest species diversity found in California native plant communities (Jimerson and others in Jimerson and Carothers 2002). The TNF manages about 13,886 acres oak woodland. There are about 40 miles of NFTS and 19 miles of motorized trails un-authorized for motorized use located in oak woodland plant communities.

Oak woodlands have experienced extensive historic disturbance through harvest of the oaks for fuelwood cutting, mining timbers, domestic and commercial construction, and widespread and heavy livestock grazing (ibid). No other ecosystem in the Sierra Nevada has experienced more human influence over a longer time period than the oak woodlands (Anderson in SNFPA 2001). Threats to oak woodlands across the State include: urbanization, conversion to agriculture, fragmentation, low rates of regeneration, competition from weeds, and sudden oak death. Motorized vehicles impact these ecosystems on TNF lands by introducing and spreading weeds, damaging native vegetation, increasing soil erosion and fragmenting habitats. The TNF does not have any rare plants or fungi that are entirely dependent on oak woodlands.

Oak woodland vegetative recovery: It is believed that oak woodlands are not regenerating in a sustainable fashion (McCreary 2004). The natural regeneration of some oak species is apparently inadequate to replace trees that are harvested or die naturally (Bartolome et al in McCreary 2004). Therefore, motorized trails un-authorized for motorized use located in oak woodlands that are no longer used by motorized vehicles may not experience a significant amount of oak regeneration. However, it is recognized that the best growing site for acorns is shaded, bare mineral soil (McDonald and Tappeiner in SNEP 1996). Acorns that fall onto the bare soil (wheel track areas) created by these motorized trails from adjacent trees may have a better chance of becoming established. However, motorized trails un-authorized for motorized use will have changed soil porosity in the wheel track areas. The moisture content of soils

under the wheel track areas declines even if the use is removed (Helvey and Kochenderfer 1990 in Trombulak and Frissell 2000) probably due to the changed soil porosity. In addition, the increase of sunlight to the ground in the motorized vehicle disturbed area may cause a change in ground cover from sparse grass to heavy grass and shrubs. However, the nature and rate of vegetative recovery will vary from site to site dependent on such factors as soil, slope, exposure to the sun and local microclimate (Johnson and Tietje – date unknown).

Forest Edges and Openings

Forests of all ages contain edges and openings. Plants dependent on edges and openings within forested plant communities are not considered habitat specific. Forest edges and openings occur in all plant communities. Therefore the number of acres of forested edge and openings on TNF system lands overlaps with the acreages in the other plant communities discussed. There are 1,708 miles of NFTS and 925 miles of motorized trails un-authorized for motorized use within forest edges and opening plant communities. Forest edge and openings are constantly being created as trees and other vegetation dies. Forest edge and opening plant communities are lost as vegetation grows into them. In this analysis, sensitive species with potential habitat within forest edge and openings include: *Astragalus webberi, Calochortus clavatus* var. *avius, Clarkia biloba* ssp. *brandegeae, Fritillaria eastwoodiae, Lewisia kelloggii* ssp. *hutchisonii, Lewisia kelloggii* ssp. *kelloggii, Lupinus dalesiae, Penstemon personatus*, and *Phacelia stebbinsii*. Watchlist species with potential habitat within edge and opening plant communities include: *Androsace occidentalis* var. *simplex, Erigeron petrophilus* var. *sierrensis*, and *Lilium humboldtii* ssp. *humboldtii*.

Motorized vehicle use impacts these habitats by increasing the risk of weed introduction and spread, reducing plant cover, increasing erosion, reducing photosynthetic ability by covering vegetation with dust, changing water flow patterns, and compacting soil.

Vegetative recovery in forest edge/opening areas: Native vegetation that responds to the creation of an opening in the canopy (increased light to the soil and increased nutrient availability) are generally considered earlier succession species. The length of time it takes a disturbed area to revegetate in forest edge/opening areas is dependent of a number of factors. In most cases, the soil contains seeds of native plants that will germinate and grow within the first year assuming top soil and water are available. This vegetative recovery is expected irregardless of the plant community where the forest edge/opening occurs. For example the understory species associated with old growth, including those dependent on the litter depth and mycorrhizal fungi of old-growth forest floors, will grow into small openings (Lindh and Muir 2004) as well as native shrub species located in young forest areas such as plantations (personal observation). Revegetation of motorized trails un-authorized for motorized use by native plants will begin within the first year as long as the motorized trails un-authorized for motorized use do not experience continued disturbance. Again, top soil and moisture will be needed for the native plants to survive. If the soil and hydrology of the road or trial has been extremely altered, revegetation may not occur until further action is taken. The greatest species and plant losses take place in the first few passes by wheels. Plant and soil damage increase with the amount of weight and power applied (Yorks et al 1997). Greater soil moisture and/or deeper overstory shading magnify these impacts (ibid).

High Elevation Openings and Rocky Areas

Some plants only grow in openings at high elevations (generally 6,000 feet and above). Trees may be present in the area, but they do not form closed canopy situations. The TNF manages 43,240 acres of high elevation openings and rocky areas. There are 79 miles of NFTS and 36 miles of motorized trails un-authorized for motorized use in these plant communities. Sensitive species with potential habitat within these types of plant communities include: *Arabis rigidissima* var. *demota, Erigeron miser, Eriogonum umbellatum* var. *torreyanum, Lewisia longipetala,* and *Tauschia howellii*. Watchlist species that have potential habitat within these types of plant communities include: *Asplenium trichomanes-ramosum, Claytonia megarhiza* and *Tonestus eximius.*

These habitats are generally steep and have highly erosive soils/rock outcrops/rocky openings. When motorized vehicle use occurs near or within the habitat itself, damage to the habitat can be severe. The plants dependent on these plant communities do not appear to compete well with other vegetation. Therefore, weed introduction and/or spread is a significant risk. These plant communities are already subject to natural erosion and have a short growing period. Any disturbance increases erosion risk and can cause significant impacts to the soil and water components of the habitat.

Vegetative recovery in high elevation openings and rocky areas: Studies documenting the time it takes for a disturbed area to revegetate in high elevation, rocky areas are very limited. It is known that these areas have limited growing seasons and harsh conditions in regard to temperature extremes. Any disturbance within these habitats would disturb and/or remove vegetation and leaf litter. Due to the steepness of many of these habitats, disturbance would accelerate erosion. Given these factors, it is likely that disturbed areas would not recover on their own. This is dependent on the amount of disturbance and other factors. Climate factors such as heavy snow years and unchecked soil erosion can limit plant establishment and stop the vegetative recovery process or push it back by several decades (Willard et al. 2007).

Noxious Weed Infestations

Sierra Nevada region biodiversity is at increased risk due to alterations in human uses, fire regimes, and 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. Opportunities for replacement of native species with weeds will be enhanced (Franklin 2003). In general terms, Tahoe National Forest (TNF) system lands are considered weed free, with most weed occurrences located along roads and/or in highly disturbed areas such as landings. The lower elevations on the westside of the forest currently contain the worst weed infestations and provide the entry points for many weeds into the TNF. It is a major "source" for weeds that are moving upslope into coniferous forests.

When an area is heavily infested with weeds, they directly compete with native plants and can cause their local displacement. In addition, weeds can have a number of indirect effects including changes to: aesthetic values, biological diversity and ecosystem services (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

recreational or aesthetic values (Mack et al. 2000, Di Antonio et al. 2004). They can hybridize with native species (ibid) altering native plant genetics.

Maintaining or improving the NFS lands requires the maintenance and improvement of the basic ecosystem elements of soil, water and vegetation. The stability and ecological function of natural wildlands depend on a diverse community of native plants (Mullin et al 2000). Native vegetation provides resilience against drought, flooding, minimizes erosion, promotes water infiltration and storage, along with providing wildlife and recreation values. Areas infested with weeds do not provide these ecosystem services at the same level as native vegetation. Research has shown that sites dominated by weeds have increased rates of soil erosion and runoff causing degradation of habitat for wildlife and native vegetation.

Once weeds become established, it is hard to get rid of them. Weeds arrived in the United States (many come from Eurasia) without the insects and diseases that preyed on them, and the plants that evolved in competition with them in their native land. Without insects, diseases, etc. to control these weeds, they can increase at a rapid rate.

Disturbed areas generally have more weeds than non-disturbed areas. Weeds are more likely to have higher leaf area and lower tissue construction costs (advantageous under high light and nutrient conditions) and greater phenotypic plasticity than native plants. Increased resource availability and altered disturbance regimes associated with human activities often differentially increase the performance of weeds over that of natives (Daehler 2003).

Weeds that have the potential to reduce local diversity or transform ecosystems have been called "transformer species" (D'Antonio et al. 2004). Transformer species have the potential to form monotypic stands, and greatly alter resource availability, trophic structure, ecosystem productivity, and/or disturbance regimes (ibid). Some of the transformer species invading the Sierra Nevada include: cheatgrass (*Bromus tectorum*), medusahead (*Taniatherum caputmedusae*), yellow star thistle (*Centaurea solstitialis*), spotted, diffuse and Russian knapweed (*Centaurea maculosa*, *C. diffusa*, and *Acroptilon repens* respectively), perennial pepperweed/tall whitetop (*Lepidium latifolium*), purple loosestrife (*Lythrum salicaria*), dalmatian toadflax (*Linaria genistifolia* var. *dalmatica*), leafy spurge (*Euphorbia esula*), gorse (*Ulex europaea*), French broom (*Genista monspessulana*), Scotch broom (*Cytisus scoparius*), Spanish broom (*Spartium junceum*), Himalayan blackberry (*Rubus discolor*), Russian olive (*Eleagnus angustifolia*) and Saltcedar (*Tamarix parviflora* and *T. ramosissima*) (ibid). A few of these weeds are widespread, but many are still relatively restricted within the Sierra Nevada (SNFPA 2001 in D'Antonio et al. 2004). Areas without motorized vehicle use are more resistant to weed introduction. Refer to Table 3.06-3 for information about the weeds known to occur on TNF lands.

Motorized vehicle use is known to enhance weed introduction in a number of ways (Trombulak and Frissell 2000) including increasing weed introduction by moving weed seed and plant parts from place-to-place in the mud/soil on their tires, and/or on the vehicle body. Motorized vehicle use disturbs native plant communities and makes the habitat more suitable for weed growth by reducing native plant cover. The disturbed areas within and adjacent to major highways, general forest roads, two-tracked non-maintained roads, and motorcycle trails (system and un-authorized-for public use) provide habitat for any weed seed deposited there. Weeds are known to be spread by motorized vehicle use regardless of the season of use. Native vegetation is also known to be physically damaged by motorized vehicle use regardless of the

season of use. Season of use may or may not affect the rate of spread of weeds, and/or the creation of bare soil. When weeds become established in these edge areas, they provide the weed seed source for new occurrences of weed in the areas adjacent. When native plants are replaced by weeds, the entire ecosystem can be altered. For example, when motorized vehicle use introduces weeds into new areas and the weeds become established, the fuel pattern is frequently changed. Weeds such as Scotch and Spanish brooms, cheatgrass, and others, change the arrangement of vegetation, the amount of soil moisture at specific times of the year, the amount of fuel available to burn, and how fire behaves. In addition, motorized vehicle use of the various motorized trails un-authorized for motorized use is known to increase the chance of ignition through engine sparks, sparks from friction (e.g. rock bouncing on rock), and human negligence. If a wildfire occurs in a weed infested area, many weeds such as cheatgrass and French/Spanish broom have the competitive edge over native plants when the burned area begins to revegetate. Eliminating motorized vehicles from natural areas is the most effective strategy for stopping the introduction of weeds into new areas (Rooney 2003).

The rate that weeds are introduced to a new motorized trail is unknown. In one study, Rooney (2003) collected mud from the undercarriage of 14 motorized vehicles. He found that seeds germinated from the soil collected from 4 of those vehicles. In the same study, he reported that each vehicle carries an average of 3.6 seeds. When he multiplied this number by the number of motorized vehicle user days, he estimated that about 6 million seeds were transported per vehicle per year in Wisconsin. Rooney predicted that over the long term, with motorized vehicles as seed dispersers, the fraction of roads/trails colonized by weeds would increase until all motorized roads and trails had reached a weed saturation level. This prediction was based on the lack of constant, extensive, effective surveillance of motorized vehicle routes. He noted that motorized vehicles are known seed carriers, that there is invariably a time lag between the time weeds colonize an area and when they are detected, and another time lag between detection and eradication efforts. He also reported that weeds are generally better adapted to vehicular dispersal than native species due to their small seed size, high seed production, and persistent seed banks. In this analysis, 100 feet was chosen to define the distance that weed seed would travel on tires. In reality the distance is probably further than 100 feet and/or less than 100 feet dependent on many factors.

Motorized vehicle use also disturbs plant communities making the habitat more suitable for weed growth by reducing native plant composition. When native plants are replaced by weeds, the entire ecosystem can be impacted including microbial flora and fauna and insect pollinators, all of which contribute to normal ecosystem function. In addition, these disturbed areas create edges within the various plant communities where they are located. Edges are recognized as potential starting points for invasions of weeds into the less disturbed areas of the rest of the plant community such as forested areas (Pauchard and Alaback 2005). Less disturbed areas such as the interior of a forest are usually considered less susceptible to weed invasion because of a combination of factors such as competition from native species, fewer sites for seed germination, less solar radiation and less seed dispersal. However, weed establishment is not based on disturbance alone. When a weed seed source is sufficiently close to a plant community, that plant community/habitat is at increased risk of weed introduction and spread.

Disturbance by motorized vehicles can have long-term effects to soils and favor weed establishment. Motorized vehicles compact soils reducing water infiltration and accelerating erosion. They also displace

soils and sheer off vegetative roots. If these effects are severe there can be a loss of soil productivity. Numerous passes by vehicles over vegetation causes the plants to die exposing the soil organic layer. The loss of vegetative cover makes the soil organic layer more susceptible to erosion. Loss of vegetative cover and the soil organic layer reduces the ability of the soil to hold moisture. Many weed species are more capable of utilizing less productive soils with less soil moisture. Some weeds can also produce secondary chemical compounds that inhibit native plant germination and growth. These compounds also affect nutrient cycling rates by inhibiting soil microbial fauna activity.

Maintenance of roads/trails/areas can also spread weeds. Grading disturbs soil and competing vegetation, and also transports soil, and weed seeds/parts to new locations. Cleaning ditches/developing waterbars moves soils and creates ideal seedbeds. Seeds from equipment can be deposited in stream crossings and washed downstream. Mower heads can also move weed seeds/parts to new locations. This movement of weed seed/parts can happen at any time of the year since the seeds and parts are present in the soil at infested sites at all times of the year. Stockpiles of crushed aggregate can also be infested with weeds. When that aggregate is moved to a new location, the weeds go with it.

Another aspect of motorized vehicle use that helps to spread weeds is tied to the use of recreational areas and facilities, such as trailheads, campgrounds, and dispersed camping areas. These areas are frequently the first site on NFS lands that the motorized vehicle comes in contact with after leaving major highways. Therefore, they frequently receive weed seed and plant parts. These areas have constant soil disturbance which provides a good seedbed for any weed seed that is deposited. In addition, the users themselves (recreationists) can also disperse weed seeds on their clothing, footwear, and camping equipment. Since many campgrounds are located near riparian areas and riparian areas in campgrounds frequently have high levels of public activity, they have a higher risk of weed infestation. Many weeds are adapted to riparian areas and rapidly become established on sites where soils have been disturbed, such as eroding stream banks, road and trail crossings, and undeveloped trails. Also, streams can carry weed seeds and plant parts great distances, hastening weed spread. Aquatic weeds, such as purple loosestrife, can take over whole wetland ecosystems, impeding water flow and reducing the quality of wetland habitats.

Table 3.06-3. Some of the Weeds known to occur on TNF System Lands

Weed Species	CDFA*	California Invasive Plant Council**
***Ailanthus altissima* (tree-of-heaven)**	C	Moderate
***Bromus tectorum* (cheatgrass)**	N/A	High
***Carduus nutans* (musk thistle)**	A	Moderate
***Carduus pycnocephalus* (Italian thistle)**	B	Moderate
***Centaurea diffusa* (diffuse knapweed)**	A	Moderate
***Centaurea maculosa* (spotted knapweed)**	A	High
***Centaurea solstitialis* (Yellow star thistle)**	C	High
***Centaurea melitensis* (tocalote or Malta star thistle)**	C	Moderate
***Chondrilla juncea* (skeleton weed)**	A	Moderate
***Cirsium arvense* (Canada thistle)**	B	Moderate
***Cirsium vulgare* (bull thistle)**	C	Moderate
***Cytisus scoparius* (Scotch broom)**	C	High

Weed Species	CDFA*	California Invasive Plant Council**
***Genista monspessulana* (French broom)**	C	High
***Hypericum perforatum* (Klamath weed)**	C	Moderate
***Lepidium latifolium* (tall whitetop)**	B	High
***Linaria genistifolia* ssp. *dalmatica* (dalmatian toadflax)**	A	Moderate
***Robinia pseudoacacia* (black locust)**	N/A	Limited
***Rubus armeniacus* (=*R. discolor*) (Himalayan blackberry)**	N/A	High
***Spartium junceum* (Spanish broom)**	N/A	High
***Verbascum thapsus* (wooly mullein)**	N/A	Limited

*California Department of Food and Agriculture Ratings (CDFA) 2007
A-Eradication, containment, rejection, or other holding action
B-Eradication, containment, control or other holding action at the direction of the County Agricultural Commissioner
C-State endorsed holding action and eradication only when found in a nursery

**California Invasive Plant Council Ratings (CalIPC)
High – Severe ecological impacts, reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Species usually widely distributed ecologically among and within ecosystems.
Moderate – Substantial and apparent, but not severe, ecological impacts; attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
Limited – Invasive, but either their ecological impacts are minor on a statewide level or information on them is insufficient to justify a higher rating, although they may cause significant problems in specific regions or habitats. Reproductive biology and other attributes result in low to moderate rates of invasion. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Sensitive plants and fungi and/or watchlist species occurrences located in and/or near motorized vehicle roads/trails/areas have a high risk of negative impacts from weed introduction and spread. Surveys of about 62 miles of motorized trails un-authorized for motorized use have been completed. The remainder will be surveyed in FY 2008.

Several of the known occurrences of weeds on the TNF are known to directly and indirectly impact sensitive plant occurrences. For example, an occurrence of the sensitive species *Clarkia biloba* ssp. *Brandegeae* is currently being impacted by the invasion of yellow star thistle along the Mosquito Ridge road located outside of Foresthill. Table 3.06-4 displays motorized trails un-authorized for motorized use where sensitive/watchlist plants and/or plant communities have been discovered. These occurrences are at increased risk of loss of individuals and habitat due to weed introduction and spread over the short and long term. The sensitive/watchlist species occurrences that have known weed occurrences located within ½ mile are at even greater risk of negative impacts from weed infestation.

Table 3.06-4. Motorized Trails Un-authorized for Motorized Use with Sensitive and Watchlist Plants/Plant Communities*

Route ID	Name of Sensitive/ Watchlist Plant, watchlist plant community	Known weed occurrence within 100 feet
TKN-J2	Vernal pool	None
TKN-J5	*Erigeron miser*, *Bruchia bolanderi*, seep	None
TKN-M2	*Ivesia sericoleuca*, aspen, spring	Cheatgrass
TKS-11	Aspen	None
YRN-001	*Epilobium howellii*	None

Route ID	Name of Sensitive/ Watchlist Plant, watchlist plant community	Known weed occurrence within 100 feet
YRS-F1 near Fordyce Creek crossing	*Erigeron miser*	None
YRS-SF5	Seep/wetland	
SV-005	Aspen, seep	None
SV-P8	Aspen	None
SV-P14	Aspen	Cheatgrass, musk thistle

*Sensitive plant occurrence is within 100 feet of the road/trail/area.

Vegetative recovery in weed infested areas: When the motorized vehicle use on motorized trails un-authorized for motorized use is removed, the recovery of native vegetation can be affected by the presence of weeds within and adjacent to that route. Vegetative recovery in areas infested with weeds may not occur if the weeds are not eliminated and desired native vegetation is encouraged (Bard et al 2008). The amount of time needed for the motorized road or trail to revegetate with native species is dependent on many factors including the type of weed at the site. Refer to the weed risk assessment for this project located in Appendix M for more information about ecological characteristics of weeds known to occur on the TNF. Continued motorized vehicle use within aspen clones could spread weeds so that aspen regeneration is reduced and increase the risk of loss of these clones.

Native Plant Habitat Fragmentation

Many acres of TNF system lands are considered fragmented with other ownership lands 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 Nevada, and local municipalities and agencies of municipalities. The presence of these inholdings affects the current condition and future outlook of TNF system lands. For example, most of the lower elevation, westside oak woodland plant communities are in private ownership and are experiencing rapid development as home sites. The existence of developed land adjacent to NFS land often increases the amount of human activity on the NFS land and increases the risk of un-authorized (for public) use, and weed introduction/spread onto NFS lands. The natural resources located on inholding lands can be managed much differently that NFS lands. For example, inholdings can influence plant communities/habitats by reducing the connectivity of plant communities (habitat). 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. The largest geographic areas other than wilderness on TNF system lands are the inventoried roadless areas. Wilderness, special interest areas (SIAs), and research natural areas (RNAs) also provide some native plant connectivity and are briefly described below. Refer to section 3.09 for a more information about wilderness, SIAs, and RNAs.

Wilderness: The Granite Chief wilderness is about 24,864 acres in size and contains high elevation forests and meadows. Motorized vehicle use within Granite Chief is prohibited. None of the alternatives change management of this wilderness area. Therefore, native plant connectivity within the wilderness area will not be impacted by motorized vehicle activity regardless of the alternative selected.

SIAs: The SIAs located on the TNF include: Placer County Big Tree Grove Botanical area, Devil's Postpile Geologic area, Glacier Meadow Geologic area, Grouse Falls Scenic area, Meadow Lake Cultural area, Sagehen Headwaters, and Mason Fen area. No changes in management of these SIAs will occur under implementation of any of the alternatives. Motorized vehicle use within these SIAs is either excluded or discouraged. Therefore, native plant connectivity within these SIAs will not be impacted by motorized vehicle activity. Table 3.06-5 summarizes information about these SIAs.

Table 3.06-5. Special Interest Areas on the TNF

Name	Acres	Key Elements
Placer County Big Tree Grove Botanical area	346	Northern most grove of giant sequoia and unique plant associations.
Devil's Postpile Geologic area	69	Postpile geologic feature in a remote area.
Glacier Meadow Geologic area	84	Represents a landscape shaped by glacial action.
Grouse Falls Scenic area	220	One of the highest cascading waterfalls in California.
Meadow Lake Cultural area	58	Represents historic and prehistoric cultural sites.
Sagehen Headwaters	79	Virgin red fir, mountain hemlock, and mountain mahogany plant communities in an avalanche forest. Over 130 plant species including a rare lichen species.
Mason Fen	30	The largest fen in the Sagehen Basin vicinity. Over 40 plant species known to occur in the fen including *Drosera rotundifolia* (round leaf sundew) and *Drosera anglica* (English sundew). This SIA is currently located within the Sagehen Experimental forest.

RNAs: Lyon Peak/Needle Lake, Sugar Pine Point and Babbitt Peak are the RNAs located on the TNF. Table 3.06-6 summarizes information about these RNAs. Motor vehicles are excluded from all of these RNAs including the no action alternative. Therefore, native plant connectivity within these RNAs will not be impacted by motorized vehicle activity. None of the alternatives propose changes to the existing management of these RNAs.

Table 3.06-6. Research Natural Areas on the TNF

Name	Acres	Key Native Vegetation Elements
Lyon Peak/Needle Lake	700	Mountain hemlock
Sugar Pine Point	625	Mixed conifer forest
Babbitt Peak	1061	Washoe pine and mature stands of mountain mahogany

Inventoried Roadless Areas: The TNF has eleven inventoried roadless areas. The character and amount of roads, private land, and motorized trails varies greatly by roadless area. Refer to Table 3.06-7 for the names and acres of inventoried roadless areas on the TNF and section 3.09. Some of the inventoried roadless areas contain motorized roads/trails. Some of the motorized trails un-authorized for motorized use located within inventoried roadless areas started as mining trails and were not made for motorized vehicle use. Over time, these foot/animal trails became wagon trails and then vehicle trails and eventually some of them have become NFTS motorized roads or trails. Current use of the motorized trails un-authorized for motorized use in TNF inventoried roadless areas is considered light to moderate primarily due to such factors as level of difficulty and remote location. The existing condition of the NFTS motorized roads/trails/areas and motorized trails un-

authorized for motorized use within TNF inventoried roadless areas varies. Refer to Appendix A (Road Cards) for a list of mitigations required by motorized trail proposed to be added to the NFTS.

Table 3.06-7. Inventoried Roadless Areas on the TNF*

Name	Acres**	Elevation (feet)
West Yuba (RARE II)	16,601	3600-6800
East Yuba (RARE II)	18,502	3600-7240
North Fork Middle Fork American (RARE II)	10,653	1600-4800
Bald Mountain (RARE II)	6,253	6300-8760
Middle Yuba (RARE I)	7,855	3200-6800
Castle Peak (RARE I)	9,301	6900-9000
Lakes Basin (RARE I)	551	6640-7440
Duncan Canyon (RARE II)	8,703	5100-7182
Grouse Lakes (RARE II)	10,096	5500-8000
Granite Chief (RARE II)	25,975	5000-8800
North Fork American River (RARE II)	34,275	2100-8000

* Refer to Appendix G of the TNF Land and Resource Management Plan
** Net Tahoe National Forest acres

Large geographic areas such as inventoried roadless areas that are relatively undisturbed by humans are important for native plants both individually and cumulatively to help maintain species viability and biodiversity in all parts of the United States (USDA FS 2000). Nationally, they play an important role in providing habitat for threatened, endangered, proposed and sensitive (TEPS) plant species (ibid). TNF inventoried roadless areas are not known to contain TEP plants, but do have occurrences of sensitive and watchlist plants. Nationally, inventoried roadless areas provide important habitat for more than 1,400 sensitive and almost 100 threatened, endangered and/or proposed (TEP) plant species (ibid) and are considered important biological strongholds for native plant species and communities (ibid). TNF inventoried roadless areas have not been surveyed. Therefore, the number of TEPS and watchlist plants/plant communities that occur within them is unknown.

Native vegetation within large geographic areas such as inventoried roadless areas is less likely to be exposed to disruption by human activities such as collection, trampling, and other surface disturbance. This lower level of human disruption may make inventoried roadless areas important references for understanding the natural composition and dynamics of native plant communities (USDA FS 2000). Roadless areas are less likely to experience problems with weed species and are more likely to be able to maintain intact native plant communities (ibid).

Large geographic blocks of land such as inventoried roadless areas are especially important areas for maintaining native plant diversity (Loomis et al. 2000). Conservation and management of the biodiversity of the Sierra Nevada is a priority and human land uses are considered the most pervasive threats to native plants in the Sierra Nevada (Murphy et al. 2004). Large geographic blocks of land contain naturally functioning ecosystems that provide many valuable services including watershed protection, carbon storage, nutrient cycling, pest control, pollination, and fish and wildlife habitat. Preserving naturally functioning ecosystems (natural environments) provides many benefits to society (Krutilla and Fisher 1975 in Loomis et al. 2000).

The effects of motorized vehicle use on native plant communities located within relatively large geographic areas have not been fully studied. However, motorized vehicle use is known to change the plant composition within the areas where the use occurs. In one study done in Idaho, native shrubs/bunch

grasses/microbiotic crusts were less prevalent and disturbance loving plants were more prevalent closer to motorized trails. Motorized vehicles directly damaged the native plants and microbiotic crusts and disturbed the surrounding habitat enough to facilitate invasion by weeds. Many weeds (such as the cheatgrass in this study) are known to help spread fire. When wildfire occurs in areas infested with cheatgrass, the native vegetation is frequently lost and the cheatgrass spreads - eventually becoming a monoculture. Motorized vehicle use is also known to increase the amount of bare ground and decrease the cover of microbiotic crust, negatively affecting nutrient cycling and increasing erosion. Dust created by the motorized vehicle use can decrease native plant cover by reducing rates of photosynthesis, leaf conductance, transpiration, and water use efficiency. Dust can also increase temperatures of leaves and stems and decrease leaf surface areas (Munger et al 2003). Changes in plant composition and plant community functions (such as the rate and spread of wildfire) reduce native plant connectivity and fragment native plant communities. In general, the degree of fragmentation/amount of connectivity loss depends on the intensity and extent of motorized vehicle use. However, even a single motorized vehicle pass can kill and/or injure many types of native plants and introduce weed seed. Native plants with shallow root systems are especially vulnerable (Wilshire 1983, Lacey et al. 1997). Native vegetation species vary in their ability to resist being damaged and in their ability to recover from the damage (Cole 1995). However, all native vegetation appears to have a threshold beyond which the species can no longer recover from motorized vehicle damage and/or other disturbances.

Loss of native vegetation increases the risk of soil loss due to wind and water erosion. Soil erosion accelerates decomposition of organic matter, weakens soil aggregate stability and results in the formation of inorganic surface crusts. Inorganic surface crusts increase water runoff, inhibit seed germination and emergence of seedlings, and reduce water penetration. Natural soil stabilizers such as lichen, fungal and algal crusts are highly vulnerable to damage from motorized vehicle use (Cole 1995).

Motorized vehicle use is known to influence the native vegetation and therefore the biodiversity of the area where the use is occurring. As mentioned above, plant biodiversity is at an increased risk of adverse cumulative effects from increased population growth and associated land uses, land conversions, and nonnative species invasions (plant and animal) both nationally and regionally. National Forests with many inholdings such as the TNF have increased risks to biodiversity from nonnative species invasions. Limiting motorized vehicle disturbance within these large geographic areas would provide increased assurances that biological diversity in those areas would be conserved. This biological diversity conservation would be achieved by maintaining the native plant communities where weed species are currently rare, uncommon, or absent because motorized vehicles are known to introduce weeds into new areas. Once weeds are established, they provide a source of weed seed to spread to new areas. The value of large geographic areas such as inventoried roadless areas in conserving biodiversity is likely to increase as native plant communities are lost and/or degraded (USFS 2000). Native plant community loss and degradation, and impacts to native plant communities from the invasion and/or encroachment of weeds are increasing nationally and regionally. Increased weed infestation is recognized as a primary threat to biodiversity.

Season of use: The impact to native vegetation from the season that the motorized vehicle use occurs varies by plant community and by rare plant species. However, the significance of beneficial or negative

impacts from the season of use action is difficult to quantify for a number of reasons. Removing motorized vehicle use of the NFTS during the wet season does reduce the potential amount of erosion from that motorized trail that could occur especially if the trail becomes rutted. However, this amount of potential erosion can not be quantified. Determining where the rutting and erosion would take place and if that erosion would impact rare plant and fungi species and/or rare plant communities is difficult. It is reasonable to assume that those rare plants/fungi and/or plant communities located within 30 feet of a motorized trail would not benefit if that rare plant/fungi and/or plant community experienced soil erosion due to motorized vehicle use regardless of the season of use. Some rare plants/fungi would not be or would have limited impacts from season of use restrictions. Those rare plants and plant communities that are aquatic/riparian plant community dependent are always subject to erosion and/or soil rutting because those native plants grow in soils that are wet/moist year-around. Serpentine (ultra-mafic soils) plant communities are considered highly erosive year-around. The known occurrences of rare plants located within 30 feet of the NFTS that are dependent on older forest plant communities (such as *Cypripedium fasciculatum* occurrences) are all located within road cut banks. Due to their location in reference to the NFTS roads, they would not be at risk from increased erosion (caused by a change in season of use) unless the entire road washed out. Erosion at levels that would wash out entire roads is not expected. Therefore, in this analysis, the effects of implementing the various seasons of use (as they vary by alternative) on unsurveyed potential habitat are analyzed in general terms by plant community grouping.

Temporary order: The TNF has issued a temporary forest order which prohibits travel off of existing roads and trails as shown on forest order exhibit maps. The order is established for a period not to exceed two years to protect resources and help prevent additional motorized trails un-authorized for motorized use from being established while the TNF undertakes implementation of the Travel Management Rule and the production of the Motor Vehicle Use Map (MVUM). Therefore, the creation of new motorized trails un-authorized for motorized use (which is the expression of cross country travel) and the associated resource damage caused by cross country travel has been legally – at least temporarily – stopped. This analysis recognizes the miles of motorized trails un-authorized for motorized use that were known when the analysis began, i.e. 1400 miles. For this analysis, implementation of the temporary order is considered beneficial to native vegetation. Comparing the no action alternative that allows cross country travel to the action alternatives that do not allow cross country travel provides the reader with an overview of how cross country travel affects native vegetation once this temporary order expires.

Change in class of vehicles: Changing the class of vehicle allowed to use a particular road does not change impacts to sensitive species and watchlist plants/plant communities. These roads already have hardened surfaces that lack vegetation. It is likely that direct impacts to sensitive species and watchlist plants/plant communities occurred when the road was developed. Indirect impacts may still be occurring if the sensitive species and watchlist plants/plant communities have survived within 100 feet of the road. These indirect and cumulative impacts would continue regardless of the type of vehicle using the road. In addition, there are no studies that indicate one type of vehicle spreads weed seed and/or weed plant parts more than another. Therefore, changing the class of vehicle does not make the road more or less susceptible to weed introduction and spread and does not reduce the risk of sensitive species and watchlist plants/plant communities being lost or degraded.

Environmental Consequences

Mitigation measures specified in Appendix A will be implemented in all of the action alternatives. These mitigation measures will provide benefits to sensitive and watchlist species. Part of the project description for all of the action alternatives is to mitigate serious and adverse erosion problems on motorized vehicle roads/trails/areas before those roads/trails/areas are available for use. Regardless of the alternative selected, sensitive and watchlist species will continue to be negatively impacted by motorized vehicle use until erosion from roads/trails/areas is reduced and/or eliminated. Surveys of about 62 miles of proposed roads/trails/areas (and those NFTS roads and trails used to access them) showed that some have erosion problems along some portion of the route. Refer to the survey records located in the project files.

All of the action alternatives prohibit cross country travel on 717,900 acres which includes 1,400 miles of motorized trails un-authorized for motorized use and therefore have less risk of negative impacts to sensitive and watchlist plants and plant communities than the No Action alternative. When motorized vehicle use is prohibited on roads/trails/areas (as under the action alternatives) this would benefit sensitive and watchlist species. Other sensitive and watchlist species that need openings would not benefit. Others may continue to be used for non-motorized recreation. Non-motorized recreational activities can also negatively impact sensitive and watchlist species through direct impacts to the plants and competition from invading weeds, but foot and horse travel are considered less impacting than motorized travel.

Indicator Measures: 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 watchlist species and plant communities; native plant connectivity; and profession judgment.

- Prohibition of cross country travel
- Number of perennial and intermittent water crossings.
- Proposed addition to the NFTS within 100 feet of unsurveyed potential habitat.
- Sensitive and/or watchlist species and watchlist plant communities within 30 feet of proposed addition to the NFTS (direct effects). Note: 30 feet was chosen to represent about one vehicle length from a motorized trail edge.
- Sensitive and/or watchlist species and watchlist plant communities within 100 feet of proposed addition to the NFTS (indirect effects). Note: 100 feet was chosen as the distance for indirect impacts such as dust.
- Weed infestations within 100 feet of the proposed addition to the NFTS. Note: 100 feet was chosen to represent the indirect effect of weed introduction and spread.
- Miles of proposed additions to the NFTS within inventoried roadless areas.

Elements of the proposal: In addition to the indicator measures, the alternatives are compared by plant community with a focus on three major parts of the proposal:

- Prohibition of cross country travel (including prohibiting use on trails un-authorized for motorized use)
- Additions to the National Forest Transportation System (NFTS).
- Cumulative effects including all of the above and the reasonably foreseeable.

Impacts to native vegetation including sensitive/watchlist species do not vary significantly by alternative when the class of vehicle is changed. Alternatives were not compared by whether or not they propose wet weather restrictions because the impacts to native vegetation (including sensitive species and watchlist plants/plant communities) cannot be quantified. Refer to preceding discussions.

List of Assumptions: This analysis also based on several assumptions to help analyze direct, indirect and cumulative effects. These assumptions are listed below:

- Impacts to sensitive and/or watchlist species and watchlist plant communities are assumed to be limited to 30 and 100 feet of the motorized trail.
- Sensitive and/or watchlist species and watchlist plant communities located within 100 feet of motorized trails may be (at least) indirectly impacted by motorized vehicle use - regardless of the alternative selected.
- Sensitive and/or watchlist species and watchlist plant communities located within 30 feet of proposed motorized trails may be directly impacted by motorized vehicle use regardless of the alternative selected.
- Sensitive and/or watchlist species and watchlist plant communities occur within the identified potential habitat that has not been surveyed. Occurrence is assumed until surveys are completed.
- Non-native plants (weeds) will continue to spread along and within surfaced and unsurfaced motorized trails.
- NFTS and proposed additions to the NFTS could have increased use which may increase impacts to sensitive/watchlist species through production of dust, etc.
- The projects identified in 3.00-1 will be analyzed and implemented on TNF system lands within the next 5 to 10 years.
- All vehicles will need to be assumed “equal”. Hence the impacts to sensitive/watchlist species from a motorcycle are assumed equal to those impacts from a 4-wheeled vehicle. [The type of motorized vehicle is not a factor since all vehicles are known to have adverse impacts to natural resources (Foltz and Meadows 2007)].
- Volunteers can effectively maintain adopted trails over the long term.

Aquatic/Riparian Plant Communities - Summary by indicator measures

1. Prohibition of cross country travel

Indicator(s) used to measure effects:

- Acres open to cross country travel in aquatic/riparian plant communities (including motorized trails un-authorized for motorized use).
- Motorized trails un-authorized for motorized use within 100 feet of aquatic/riparian plant communities.
- Motorized trails un-authorized for motorized use with perennial and intermittent stream crossings

No Action: Alternative 1 does not prohibit cross country travel. The TNF currently has 717,900 acres of aquatic/riparian habitat located within 100 feet of aquatic/riparian plant communities. Cross country

travel is prohibited on 73,500 of the 717,900 acres. Currently the 717,900 acres includes 1,400 miles of motorized trails un-authorized for motorized use. Under implementation of Alternative 1 impacts to known occurrences of sensitive and watchlist species dependent on aquatic/riparian plant communities would likely increase over time as motorized vehicle use increased. As yet undiscovered sensitive and watchlist species occurrences would be at risk as new motorized trails un-authorized for motorized use were created. Cross country use would damage at least some sensitive and watchlist species occurrences and it is reasonable to expect that some occurrences would be lost. Those sensitive species considered in downward trend would be most at risk. TNF sensitive plants in a downward trend that are dependent on aquatic/riparian plant communities include: *Ivesia aperta* var. *canina* and *Ivesia webberi*. Since *Ivesia aperta* var. *canina* and *Ivesia webberi* are experiencing a downward trend across their range of occurrence, impacts to them could be significant if they occur on TNF system lands.

Direct impacts could be significant at least at the local, site specific level. Possible direct impacts include killing and/or injuring sensitive plants and the above ground portions of sensitive fungi by running over them. (In addition, soil compaction could kill the under-ground portion of the fungal species.) Possible direct impacts also include damaging native vegetation within aquatic/riparian plant communities. Severe[1] and persistent disturbance to aquatic/riparian plant communities could convert them to a different type of plant community. The significance of these direct impacts is dependent on many factors including the amount of disturbance, the sensitive species being impacted, and in some cases, the season when the disturbance takes place. For example, running over a sensitive/watchlist plant while it is in bloom could negatively impact reproduction - at a minimum. Running over the same plant while it is dormant and underground would not have the same impacts - especially if the soil health is not reduced. The significance of impacts is also dependent on the number of sensitive/watchlist species that occur in a specific location and how many of them are damaged. In addition, the significance of impacts is dependent on the amount and condition of the type of habitat needed by a particular sensitive or watchlist species across its range of distribution.

When a sensitive or watchlist species is dependent on plant communities that are limited (for example *Meesia uliginosa* is usually found in fens and fens are plant communities of limited distribution), impacts could be significant. The type of motorized vehicle is not a factor since all vehicles are known to have adverse impacts to natural resources (Foltz and Meadows 2007). It is impossible to know when or where cross country motorized vehicle use would occur, but since it would not be prohibited in Alternative 1, the risk of significant direct and indirect impacts is higher than in the action alternatives.

Implementation of Alternative 1 could indirectly impact sensitive and watchlist species when cross country motorized vehicles reduce soil health through compaction, increase erosion, change water flows, and/or introduce weeds. Indirect impacts could be significant. Undesirable impacts include severely eroded soils, hydrologically disrupted wetland ecosystems, general habitat destruction, and degraded water quality (Foltz 2006). The significance of possible indirect impacts is unknown due to the factors listed under the direct impacts section. However, in most cases, recommendations for sensitive species – especially aquatic/riparian plant communities are for protection from indirect impacts. Most TNF

[1] Severe disturbance refers to any disturbance that changes the hydrology, soil health, or vegetative cover within the plant community.

sensitive and watchlist species are considered aquatic/riparian dependent and are limited in distribution. Reductions in the health of the soil and/or changes to the amount or health of water/air/vegetation components of the habitats for sensitive/watchlist plants prevent those habitats from maintaining and performing their natural prescribed functions (Foltz and Meadows 2007). Refer to section 3.02 for more information regarding soil and water. Allowing unrestricted motorized vehicle use across the forest greatly increases the risk of negative indirect impacts to sensitive and watchlist species.

TNF motorized trails un-authorized for motorized use have about 790 perennial and intermittent water crossing and 114 miles within 100 feet of riparian vegetation. There are about 2,548 perennial and intermittent water crossings by NFTS roads and motorized trails and 219 miles located within 100 feet of riparian vegetation. According to information presented in section 3.02, the condition of NFTS roads and trails varies - with areas of high motorized route density and high erosion risk having a higher risk of accelerated erosion and sediment production and/or deposition. Section 3.02 states that - in general, higher route densities translate into higher potential for adverse effects to aquatic/riparian habitats.

Action Alternatives: All of the action alternatives prohibit cross country travel. This prohibition is expected to stop/reduce the proliferation of new motorized trails un-authorized for motorized use. The prohibition of cross country travel also includes prohibiting use on some portion of the 114 miles of motorized trails un-authorized for motorized use within 100 feet of riparian vegetation. The prohibition of cross country travel also results in fewer perennial stream and intermittent stream crossings. Therefore, the risk of direct and indirect impacts to sensitive and watchlist species and aquatic/riparian plant communities (from cross country travel) is less than under implementation of the no action alternative. Under implementation of the action alternatives impacts to known occurrences of sensitive and watchlist species and aquatic/riparian plant communities would likely be mitigated by implementation of actions to reduce/eliminate negative impacts. As yet undiscovered occurrences of sensitive and watchlist species would most likely be discovered during motorized trail surveys and mitigations would be developed to reduce negative impacts to them. (Note: Management level 1 and temporary roads proposed in Alternative 5 do not have current botanical surveys.) It is standard practice to reduce/eliminate impacts to sensitive and watchlist species when they are found. Aquatic/riparian plant community impacts would be reduced due to mitigations developed to reduce erosion. Refer to Appendix A (Road cards) for mitigations that will be applied to site specific motorized trails. Under the action alternatives, the loss/conversion of aquatic/riparian plant communities due to motorized vehicle cross country use would not occur.

All of the action alternatives prohibit use on some of the 114 miles of motorized trails un-authorized for motorized use located within 100 feet of aquatic/riparian plant communities. Tables 3.06-8 and 3.06-9 display the number of perennial and intermittent water crossings by alternative and the number of miles of motorized trail on NFS lands that are located within 100 feet of aquatic/riparian plant communities (riparian vegetation) by alternative.

2. Additions to the National Forest Transportation System (NFTS)

Indicator(s) used to measure effects:

- Miles of motorized trail proposed to be added to the NFTS system within 100 feet of aquatic/riparian plant communities.

- Number of proposed perennial and intermittent water crossings
- Sensitive and/or watchlist species occurrences (associated with aquatic/riparian plant communities) located within 100 feet of proposed motorized trails
- Weed sites located along proposed motorized trails within 100 feet of sensitive/watchlist species occurrences and/or watchlist plant communities.

No Action: Alternative 1 does not propose the addition of motorized trails to the NFTS. However, direct and indirect impacts to sensitive and watchlist plants and plant communities could be significant at least at the local level.

Surveys of about 62 miles of motorized trails un-authorized for motorized use have been completed to date. Aquatic/riparian dependent sensitive species were discovered within 100 feet of several routes; *Bruchia bolanderi* along TKN-J5, *Epilobium howellii* at the end of YRN-001, and *Ivesia sericoleuca* along TKN-M2. Cheatgrass is known to occur within 100 feet of the TKN-M2 *Ivesia sericoleuca* occurrence. Aspen plant communities (watchlist plant communities) were found within 30 feet of TKN-M2, TKS-11, SV-005, SV-P8, and SV-P14. A vernal pool was located at the end of TKN-J2. TKN-J2 is proposed under all alternatives except Alternative 3. Continued motorized vehicle use within this vernal pool would eventually cause a loss of the native plants within that vernal pool. Springs/seeps were located along SV-005, TKN-J5, TKN-M2, and YRS-SF5.

Action Alternatives: For those proposed additions to the NFTS, Tables 3.06-8 and 3.06-9 display the number of perennial and intermittent water crossings by alternative and the number of miles of motorized trail on NFS lands that are within 100 feet of aquatic/riparian plant communities (riparian vegetation) by alternative.

Under the action alternatives, the vernal pool at the end of TKN-J2 is proposed under all alternatives except Alternative 3. Continued motorized vehicle use within this vernal pool would eventually cause a loss of the native plants within that vernal pool. Barriers will be placed at the end of TKN-J2 to eliminated motorized vehicle travel within this vernal pool.

As mentioned above, springs/seeps were located along SV-005, TKN-J5, TKN-M2, and YRS-SF5. SV-005 is proposed in Alternatives 2 and 5. To reduce impacts to the seep/spring, barriers will be placed on both sides of the motorized trail where it passes through the seep. TKN-J5 is proposed in Alternatives 2, 5, 6, and 7. The water from the seep will be directed to the meadow instead of down the route. TKN-M2 is proposed in Alternatives 2, 5 and 6. Barriers will be places along the motorized trail where it passes through the aspen/spring area. YRS-SF5 is proposed in Alternatives 2, 5, 6, and 7. The damaged wetland/spring area will be restored prior to this motorized trail being opened.

Of the action alternatives, implementation of Alternative 5 has the greatest number of perennial water crossings and the most miles associated with proposed additions to the NFTS within 100 feet of riparian vegetation. Therefore, of the action alternatives, Alternative 5 has the greatest risk to water quality and aquatic/riparian plant communities (or conversely the smallest improvement in water quality conditions and aquatic/riparian plant community conditions). Therefore, of the action alternatives, implementation of Alternative 5 would have the greatest risk of negative impacts to sensitive and watchlist species dependent on aquatic/riparian plant communities. It is believed that the mitigations identified for the

vernal pool located at the end of TKN-J2, and the springs/seeps located along SV-005, TKN-J5, TKN-M2, and YRS-SF5 will reduce impacts to these plant communities.

Alternative 2 differs from Alternative 5 in that Alternative 2 proposes Reservoir access and Alternative 5 does not; and Alternative 5 proposes the networks (Cal-Ida, Boca, Mosquito, and French Meadows) and Alternative 2 does not. In addition, Alternative 5 proposes adding numerous existing NFTS Maintenance Level 1 and temporary roads (refer to the alternative descriptions in Chapter 2 for a listing) to the NFTS as motorized trails `that are not proposed in Alternative 2. Table 3.06-8 also shows that the action alternatives propose the addition of 127 crossings in Alternative 5, 35 and 37 crossings in Alternatives 2 and 6 respectively, 18 and 19 crossings in Alternatives 4 and 7 respectively, and no crossings in Alternative 3. Table 3.06-9 shows that the action alternatives propose the addition of 19 miles of motorized trail within 100 feet of riparian vegetation in Alternative 5, 6 and 7 miles in Alternatives 2 and 6 respectively, 3 miles in Alternatives 4 and 7, and no miles in Alternative 3.

Bruchia bolanderi along TKN-J5 and *Ivesia sericoleuca* along TKN-M2 are at higher risk in Alternatives 2, 5, 6, and 7 because both of those motorized trails are proposed in those alternatives. *Epilobium howellii* at the end of YRN-001 is at higher risk in Alternatives 2, 5, and 6. Since mitigations will be implemented to reduce impacts to all sensitive species occurrences, the risk is not considered significant. However, over the long term, the risk of cheatgrass spreading and out competing native vegetation including *Ivesia sericoleuca* along TKN-M2 is high. Refer to the weed risk assessment located in Appendix M for more information. Alternatives 3 and 4 do not propose TKN-J5 and TKN-M2 and cheatgrass would not be spread along TKN-M2 through motorized vehicle use of the route. The occurrences of *Bruchia bolanderi* along TKN-J5 and the *Ivesia sericoleuca* located along TKN-M2 would therefore benefit.

Of the action alternatives, Alternatives 3, 4, and 7 have the largest potential improvement in water quality conditions (and the least risk to sensitive and watchlist species dependent on aquatic/riparian plant communities) because additions to the NFTS under these alternative would result in the fewest perennial and intermittent water crossings, and fewer miles of motorized vehicle roads/trails/areas within 100 feet of riparian vegetation.

Of the action alternatives, the proposed addition of motorized trails to the NFTS under Alternative 5 would impact the most aquatic/riparian plant communities (and possibly impact sensitive watchlist species that are currently unknown). Alternatives 4 and 7 carry less risk related to the addition of motorized trails to aquatic/riparian plant communities than implementation of Alternatives 6 and 2. Alternative 1 does not propose to add any motorized trails un-authorized for motorized use to the NFTS, so while it has the least impact relative to this aspect of the alternatives; it has the greatest overall risk to sensitive and watchlist species through absence of a prohibition on cross country travel, as previously described. Alternative 3 does not propose to add any motorized trails to the NFTS and it prohibits cross country travel. Therefore Alternative 3 provides the most benefits to sensitive/watchlist species and aquatic/riparian plant communities.

Table 3.06-8. Number of Perennial and Intermittent Water Crossings by Alternative*

Perennial Stream Crossings	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Existing NFTS roads and motorized trails	670	670	670	670	670	670	670
Private and other jurisdiction roads	630	630	630	630	630	630	630
Cross country travel (motorized trails un-authorized for motorized use)	355	0	0	0	0	0	0
Additions to the NFTS	0	19	0	9	59	18	9
Total Motorized	**1655**	**1319**	**1300**	**1309**	**1359**	**1318**	**1309**
Intermittent Stream Crossings							
Existing NFTS roads and motorized trails	790	790	790	790	790	790	790
Private and other jurisdiction roads	520	520	520	520	520	520	520
Cross country travel (motorized trails un-authorized for motorized use)	373	0	0	0	0	0	0
Additions to the NFTS	0	16	0	9	68	19	10
Total Motorized	**1683**	**1326**	**1309**	**1319**	**1378**	**1329**	**1320**

*Crossings include lands under all ownerships.

Table 3.06-9. Miles* of Motorized Use on NFS Lands within 100 Feet of Riparian Vegetation by Alternative

Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross country travel (acres)	73,500	0	0	0	0	0	0
Motorized trails un-authorized for motorized use	114	0	0	0	0	0	0
Existing NFTS roads and motorized trails	172	172	172	172	172	172	172
Private/other jurisdiction roads	59	59	59	59	59	59	59
Additions to the NFTS	0	6	0	3	19	7	3
Total Motorized	**345**	**237**	**231**	**234**	**250**	**238**	**234**

***Miles are approximate

3. Cumulative effects including reasonably foreseeable

The spatial boundary of the cumulative effects analysis area is the Tahoe National Forest.

Indicator(s) used to measure effects: Past/present/reasonably foreseeable future actions that could potentially affect aquatic/riparian plant communities and the sensitive/watchlist species dependent on them as well as the benefits from prohibiting use on motorized trails un-authorized for motorized use are discussed. It is assumed that all of the action alternatives avoid significant long term cumulative impacts by implementing frequent and consistent evaluation of perennial and intermittent water crossings, implementing mitigations to reduce impacts to sensitive/watchlist species, and detection/treatment of weeds. This evaluation combined with rapid mitigation of resource damage/weed treatment avoids significant impacts to aquatic/riparian plant communities and the sensitive/watchlist species dependent on them in the long term.

Past: Management activities have occurred on TNF system and privately owned lands for over a century. Historic management activities on TNF system lands include: gold mining, gravel mining, hydroelectric development, land clearance, diversions of water for irrigation, land drainage, timber harvest, construction of roads and railroads, urbanization, livestock grazing, ground water abstraction, and

others (Kondolf et al. 1996). This long history of disturbance to aquatic/riparian plant communities has contributed to the lack of an undisturbed reference for most aquatic/riparian dependent sensitive/watchlist species. Therefore, it is not possible to quantify how these past management activities have impacted them. Historically, springs, creeks, and rivers were altered by diversion of water; meadows and fens were converted to other types of habitats due to human activity that dried them out; aquatic/riparian areas were repeatedly and heavily grazed by domestic livestock; and numerous roads were built in areas that changed the hydrology of those habitats. These activities and others have cumulatively reduced the amount of aquatic/riparian plant communities within TNF watersheds that would be suitable habitat for sensitive and watchlist species dependent on them. The amount of habitat reduction is unknown.

In addition, past management has created conditions on the landscape that frequently contribute to cross country travel. For example, skid trails that were created during a fuel reduction/timber harvest project are generally blocked off where they connect to system roads and trails once the project has been implemented. However, in a number of areas motorized vehicle users have removed the barriers blocking the skid trail and/or have gone around the barriers. Continued use of the old skid trail creates a motorized trail that has not been designed for the use, and may be located in an area that is not best suited to that use. Trail planning and design – especially location – are important considerations for limiting disturbances to natural resources (Foltz and Meadows 2007) such as sensitive/watchlist species.

Current: Current impacts to aquatic/riparian plant communities come from a variety of management activities including motorized vehicles. Motorized vehicle use within aquatic/riparian plant communities and their zones of influence (RCAs) negatively impacts the soil/vegetation/water in those areas. Use of existing NFTS motorized roads and trails and/or the motorized trails un-authorized for motorized use while they are wet can cause the formation of ruts/wheel tracks that can channel water altering area hydrology and causing erosion of soil. Vegetation in and adjacent to areas of use is negatively impacted when it is run over and/or covered in dust. Water quality is also negatively impacted when motorized vehicles add sediment and other pollutants to it. (Refer to section 3.02.) Motorized vehicle use within aquatic/riparian plant communities and their RCAs does not benefit soil, water and native vegetation within those areas. However, the significance of the negative impacts to soil/vegetation/water within specific aquatic/riparian plant communities varies. Refer to Appendix A (Road Cards) for additional information about aquatic/riparian plant communities that are impacted by motorized vehicles.

Other on going projects on the forest that impact aquatic/riparian plant communities include: special uses projects such as utility corridor construction and maintenance that pass through and impact many different types of plant communities including aquatic/riparian; minerals operations that remove native vegetation and recontour the landscape; and livestock grazing projects that allow impacts to aquatic/riparian plant communities as livestock eat the vegetation and punch hoof holes into the soil.

Several aquatic/riparian dependent sensitive species are currently impacted by use of NFTS motorized roads/trails/areas and motorized trails un-authorized for motorized use. These impacts are discussed below:

Meesia uliginosa is a sensitive moss that is currently being impacted by cross country motorized vehicle travel in the Summit fen area. In this example, cross country travel onto the fen created bare soil by killing the vegetation where the wheel tracks occurred. The aquatic/riparian plant community at

Summit fen is also indirectly impacted by use of the NFTS motorized trail located above it. The system motorized trail is channeling water and sediment into the fen and may be changing the acidity of the water (PH) of the fen. Formal monitoring of the Summit fen has not occurred. However, it is known that damage to fens/ peatlands from motorized vehicle use alters surface and subsurface flow patterns and can result in areas of bare peat and soil. Areas of exposed peat are at increased risk from drying out and being lost. Wheel tracks can also weaken or destroy the rhizomatous root network of the clonal peat forming plants. Bare ground exposes the organic soils to the atmosphere allowing their decomposition. Functioning fens/peatlands store carbon. Loss of moisture to the fen/peatland can cause the plants that make up these plant communities to die. Peat forming wetlands provide important benefits within TNF watersheds by improving water quality and providing habitat for unique plant communities. Because of the large historical loss of this type of plant community, remaining fens are considered rare. Forest Plan direction for fen management is as follows: "During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and vehicles."

Ivesia sericoleuca and *Ivesia aperta* var. *aperta* occurrences are located on the eastside of the forest in meadows and vernally wet areas. Cross country motorized vehicle use has impacted them in several locations. Motorized vehicles have created ruts in these occurrences of sensitive plants that act as drains and/or channels that change the hydrology within the plant community. Direct impacts to these sensitive plants from motorized vehicle use have killed and/or injured individual plants.

Reasonably foreseeable: When past and current impacts are added to the impacts of the reasonably foreseeable future actions identified in Table 3.00-1, risks to aquatic/riparian dependent sensitive/ watchlist species increase.

Some current and reasonably foreseeable management actions do not impact aquatic/riparian plant communities while others are expected to have minimal direct impacts. For example, westside fuel reduction/timber harvest/aspen improvement projects routinely establish a 100 foot buffer around aquatic/riparian plant communities (such as riparian vegetation along streams, fens, springs, and seeps) where no management activities are implemented. Many eastside fuel reduction/timber harvest/aspen improvement projects contain a 50 foot no treatment buffer. Some eastside fuel reduction/timber harvest/aspen improvement projects establish a 25 foot tractor keep out zone near aquatic/riparian communities such as fens where trees can be felled away from fens and removed. For example, Montez and Billabong are both projects with 25 foot tractor keep out zones in aspen clones that are adjacent to fens. The Montez BE finds that "Minimal direct effects to the fen are expected from harvesting conifers to release an aspen stand near the fen because mitigations would be implemented to minimize impacts…Indirect effects of harvesting trees uphill from the fen would be that more water would be available to the fen because conifer trees would no longer be transpiring water into the atmosphere above the fen. The reduction of shade to the site is expected to be minimal and somewhat temporary because trees that provide most of the shade during the summer months would be left in place…An increase in the amount of water would help keep the saturation level high and would maintain an anaerobic system for a longer period during the summer season" (Montez Project Sensitive Plant Biological Evaluation, Susi Urie, Page 8).

Projects other than fuel reduction/timber harvest/aspen improvement also impact aquatic/riparian plant communities. Some projects are designed to improve the health of specific aquatic/riparian plant communities by restoring the hydrology of areas such as the Carmen project. Others are designed to improve the reproduction of aspen clones by removing conifers - such as the Carvin and Brumby projects.

No Action: Implementation of Alternative 1 carries the highest risk of cumulative impacts to sensitive/watchlist species dependent on aquatic/riparian plant communities. Since (in general terms) no restrictions would be in place to limit where motorized vehicle use could occur, all aquatic/riparian sensitive/watchlist species that grow in areas that are accessible by motorized vehicle would be at risk. Since complete surveys for the forest are not available, and an undisturbed reference for aquatic/riparian plant community dependent sensitive/watchlist species is also lacking, this analysis focuses on cumulative impacts to aquatic/riparian plant communities with discussion of cumulative impacts to individual species where cross country travel/motorized vehicle use is known to impact them.

When the impacts of all past, current and reasonably foreseeable management actions are added to the possible impacts of implementing Alternative 1, (especially cross country travel) the potential to significantly impact aquatic/riparian plant communities and the sensitive/watchlist plant species dependent on them is high. Cumulative impacts could be significant over the long term and include conversion of fens and other wetlands to other types of plant communities. Aquatic/riparian plant communities frequently lack the vegetative barriers to keep motorized vehicle use from accessing them and significantly impacting their hydrology.

Implementation of Alternative 1 increases the risk of disturbance within aquatic/riparian plant communities because it does not prohibit cross country travel including the use of motorized trails un-authorized for motorized. Cross country travel including use of motorized trails un-authorized for motorized use has contributed to cumulative impacts to fens and *Meesia uliginosa* on the TNF. If the cross country use continues, the sensitive moss *Meesia uliginosa* located in Summit fen could be lost. In addition fens/peatlands and other aquatic/riparian plant communities could be converted to wet meadows or other types of plant communities over the long term.

Bruchia bolanderi is a sensitive moss that occurs along Castle Creek about 50 feet upstream and about 30 feet downstream from the Castle Creek crossing area along proposed road TKN-J5. As of August 2007 it has also been reported from the Summit fen, Round Valley meadow, and Upper Lola Montez areas. The Upper Lola Montez and Castle Creek areas are being impacted indirectly by motorized vehicle use of TKN-J5. Impacts are not currently considered significant since they are indirect impacts and this moss can tolerate some disturbance. However, if disturbance from motorized vehicle use is too frequent or the use causes significant soil compaction, the moss occurrences could be lost. All occurrences are small in area and could be significantly reduced by one vehicle pass. Implementation of Alternative 1 carries a high risk (short and long term) that motorized vehicles could significantly impact these moss occurrences since they are all located in areas that are fairly accessible to motorized vehicles.

Ivesia sericoleuca was discovered along TKN-M2. Cross country motorized vehicle use has killed and/or injured individuals within this occurrence. These impacts are not considered significant at this time. However, over the long term impacts to *Ivesia sericoleuca* occurrences from cross country travel by motorized vehicles may be significant.

Most of the known occurrences of *Ivesia sericoleuca* are known to be impacted by a combination of motorized and non-motorized vehicles, livestock grazing and/or cheatgrass invasion. There are tens of thousands of *Ivesia sericoleuca* plants known to occur on TNF system lands at this time. *Ivesia sericoleuca* plants grow in meadow plant communities where terrain and vegetation do not provide obstacles to cross country travel. TNF occurrence records for the 28 known occurrences indicate that 18 of the known occurrences are negatively impacted by off highway vehicles (OHVs). Only two occurrence records indicate no disturbances. Twenty of the 28 occurrence records indicate that livestock grazing is a negative disturbance. Over the long term, cross country travel by motorized vehicles in these plant communities, combined with past/current impacts could significantly reduce the number of *Ivesia sericoleuca* plants on the TNF. Over the long term, other occurrences of sensitive and watchlist species that are dependent on aquatic/riparian plant communities that are accessible by motorized vehicles traveling cross country could also be significantly reduced. For example, the sensitive plants *Ivesia aperta* var. *aperta* and *Pyrrocoma lucida*.

Aspen clones (watchlist plant communities) were found along TKN-M2, TKS-11, SV-005, SV-P8, and SV-P14. Over the long term, implementation of Alternative 1 could damage the aspen within these areas so much that the aspen clone is killed and/or weakened. Weakened aspen are more susceptible to disease and/or insect infestation. Cross country travel could damage or kill other aspen clones also. Since the health of aspen clones within the Sierra Nevada region is of concern, over the long term, impacts could be significant.

Other factors also add to the risk of negative impacts to aquatic/riparian dependent species from motorized vehicle cross country use. For example, some of the system and motorized trails un-authorized for motorized use end at aquatic/riparian plant communities such as wet meadows. This situation increases the risk of negative impacts to aquatic/riparian dependent resources such as sensitive/watchlist species especially when cross country travel is allowed, as in Alternative 1. For example, YRN-11 is a short motorized trail un-authorized for motorized use that ends at a wet meadow plant community. It does not have barriers to keep users from driving onto the meadow. Placing barriers at the end of YRN-11 (as proposed in the action alternatives - refer to Appendix A, Road Cards) would reduce the risk of cross country travel across this meadow. When motorized vehicle use occurs in wet meadows, soils are compacted, the hydrology is changed, and vegetation is killed. Restoration of aquatic/riparian plant communities is often time consuming and expensive. As mentioned above, many sensitive/watchlist species are dependent on aquatic/riparian plant communities.

Alternative 1 has the greatest number of perennial and intermittent water crossings, the most miles of motorized use within 100 feet of riparian vegetation, and allows cross country travel. Refer to Tables 3.06-8 and 3.06-9. Implementation of Alternative 1 has the greatest risk of introducing and spreading weeds into aquatic/riparian habitats.

Given all of the above information, implementation of Alternative 1 may impact *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium lunaria*, *Botrychium minganense*, *Botrychium montanum*, *Bruchia bolanderi*, *Epilobium howellii*, *Fissidens aphelotaxifolius*, *Helodium blandowii*, *Hydrothyria venosa*, *Ivesia aperta* var. *aperta*, *Ivesia aperta* var. *canina*, *Ivesia sericoleuca*, *Ivesia webberi*, *Meesia triquetra*, *Meesia uliginosa*, and *Pyrrocoma lucida* and may contribute to a trend for listing them as

threatened or endangered over the long term. Implementation of Alternative 1 may also impact *Androsace occidentalis* var. *simplex*, *Darlingtonia californica*, *Drosera anglica*, *Drosera rotundifolia*, *Juncus marginatus* var. *marginatus*, *Mimulus lacinatus*, *Potamogeton filiformis*, *Rhynchospora alba*, *Rhynchospora capitellata*, *Scutellaria galericulata*, *Sphagnum* species, *Utricularia minor*, *Veronica cusickii*, special aquatic features and aspen groves. At this time, impacts to watchlist plants and/or plant communities are not considered significant unless entire plant communities are lost. Based on current information, watchlist plants and plant communities that are aquatic/riparian dependent are not at risk in the short term. The number of fens and other special aquatic features that may be converted to other plant communities due to management actions combined with such variables as climatic variation and future water demands from NFS lands are not fully understood. It is known that implementation of Alternative 1 would continue to impact these limited plant communities by altering their hydrology. Refer to the watchlist report located in Appendix N. It is believed that implementation of Alternative 1 puts these plant communities at risk of being lost over the long term.

Action Alternatives: Implementation of the action alternatives will cumulatively impact aquatic/riparian plant communities and the sensitive/watchlist species dependent on them. When the impacts of all past, current and reasonably foreseeable management actions are added to the possible impacts of implementing the various action alternatives, there is a difference in the potential amount of impacts to aquatic/riparian plant communities and the sensitive/watchlist plant species dependent on them. However, those cumulative impacts are not considered significant due to the mitigations listed by motorized trail in Appendix A-Road Cards, which include implementing mitigations to reduce/eliminate direct impacts to sensitive/watchlist species.

Sensitive/watchlist species and/or watchlist plant communities located along proposed additions to the NFTS would be indirectly impacted by vehicle use of the motorized trail. Indirect impacts include reduced vigor through being covered in dust and increased risk of weed infestation. There are currently no mitigations available to reduce dust along motorized trails or to prevent the introduction of weeds along those motorized trails. Therefore, those action alternatives that add the most miles of motorized trail un-authorized for motorized use, and prohibit use on the least number of motorized trails un-authorized for motorized use have a greater risk of indirect impacts to sensitive/watchlist species and watchlist plant communities. These indirect impacts are not considered significant in the short or long term.

Alternative 5: Implementation of Alternative 5 cumulatively impacts aquatic/riparian plant communities and the sensitive/watchlist species dependent on them. Implementation of Alternative 5 has the greatest number of perennial and intermittent water crossings and proposes the most miles of motorized trail additions to the NFTS that are located within 100 feet of riparian vegetation of all of the action alternatives. Therefore implementation of Alternative 5 has the greatest risk of negatively impacting aquatic/riparian plant communities and the sensitive/watchlist species dependent on them.

Maintenance Level 1 and temporary roads proposed as additions to the NFTS in Alternative 5 do not have current botanical surveys. It is possible that these proposed motorized trails have occurrences of sensitive/watchlist species and weeds. Therefore, occurrences of sensitive/watchlist species may exist along these motorized trails that are being impacted by motorized vehicles.

Implementation of Alternative 5 would also impact known occurrences of sensitive species and watchlist plant communities along proposed additions to the NFTS. The significance of those impacts varies by such factors as the location of the species, the number of species in that location, and the amount of disturbance. For example, *Ivesia sericoleuca* is currently being directly and indirectly impacted along a portion of TKN-M2. Individual plants are being killed and injured. Mitigations have been developed to reduce and/or eliminate direct impacts to these *Ivesia sericoleuca* plants. Refer to Appendix A-Road Cards. However, there are no mitigations available that effectively reduce the indirect impacts of increased risk of weed introduction/spread and reduced vigor due to dust. Cheatgrass also occurs along TKN-M2 that is within 100 feet of *Ivesia sericoleuca* plants. Motorized vehicle use along this trail will continue to spread cheatgrass and/or create dust that will cover some of the *Ivesia sericoleuca* plants during part of the growing season. Dust covered plants do not reproduce or grow as well as those plants that are not covered in dust. Dust covered plants could be weakened to the point that they can no longer compete effectively with cheatgrass or other vegetation. Over the long term, competition for soil and water due to cheatgrass invasion and weakening of plants due to being covered with dust could kill plants. However, frequent field visits with rapid implementation of mitigations to reduce/eliminate impacts (including weed treatment) to sensitive/watchlist species (such as the *Ivesia sericoleuca* in this example), would reduce the significance of these impacts.

In another example, *Bruchia bolanderi* occurrences along TKN-J5 are currently being impacted indirectly by motorized vehicle use. *Bruchia bolanderi* occurrences at this location could also be lost over the long term if hydrology was significantly changed at the crossing of Castle Creek. With routine maintenance, significant changes in the hydrology of Castle Creek (caused by motorized vehicle use at the crossing) are not expected. In addition, over the long term, weeds could be introduced into the aquatic/riparian plant community containing *Bruchia bolanderi*. If aquatic/riparian weeds were to become established in the *Bruchia bolanderi* locations, the sensitive moss plants would be lost. Loss of sensitive species such as *Bruchia bolanderi* is considered a significant effect. When, where, and if aquatic weeds will become established is unknown. However, frequent field observations with rapid implementation of mitigations to reduce/eliminate impacts to sensitive/watchlist species reduce the significance of possible long term impacts.

Motorized vehicle use within watchlist plant communities provides another example of how frequent field observations with rapid implementation of mitigations to reduce/eliminate impacts can reduce the significance of those impacts over the short and long term. Implementation of Alternative 5 would continue to impact the aspen clones located along portions of TKN-M2, TKS-11, SV-005, SV-P8, and SV-P14. Motorized vehicle use within these aspen clones could alter soil properties. Shepperd et al. (2006) reported that recreation activities can alter soil properties if continued vehicle passes cause the stripping of small moisture-absorbing roots from large lateral roots. Motorized vehicle use could increase runoff from storm events in these aspen clones increasing erosion (Shepperd et al. 2006). Over the long term (more than 10 years), without mitigations, continued motorized vehicle use within these aspen clones could introduce disease, spread weeds so that regeneration is reduced, and increase the risk of loss of these clones.

Alternatives 2 and 6: Implementation of Alternatives 2 and 6 cumulatively impacts aquatic/riparian plant communities and the sensitive/watchlist species dependent on them. Those cumulative impacts are not considered significant in the short or long term. Since Alternatives 2 and 6 have fewer miles of motorized vehicle roads/trails/areas open for use within 100 feet of riparian vegetation and have fewer perennial and intermittent crossings than Alternatives 1 and 5, the risk of indirect impacts to aquatic/riparian plant communities is less than those discussed under implementation of Alternatives 1 and 5. Alternatives 2 and 6 also proposed fewer additions to the NFTS within 100 feet of riparian vegetation and perennial and intermittent crossings. Alternative 2 differs from Alternative 6 in that Alternative 2 proposes Reservoir access and Alternative 6 does not. Alternatives 2 and 6 reduce by about 88 percent the motorized use of perennial and intermittent crossings and about 85-86 percent of the miles of motorized use within 100 feet of riparian vegetation.

Under implementation of Alternatives 2 and 6, cross country travel by motorized vehicle users would be prohibited. Implementation of Alternatives 2 and 6 would continue indirect/cumulative impacts to special aquatic features along TKN-J5 and TKN-M2; cheatgrass would continue to be spread through motorized vehicle use of TKN-M2; and aspen would continue to be impacted through use of TKS-11, SV-P14, and TKN-M2. *Bruchia bolanderi* along TKN-J5 and *Ivesia sericoleuca* along TKN-M2 would continue to be indirectly impacted by dust and possible weed invasion. Implementation of Alternatives 2 and 6 is not expected to produce significant impacts in the short term (5 years or less) (to aquatic/riparian plant communities or the sensitive/watchlist species dependent on them) because cross country use would be prohibited. Implementation of Alternatives 2 and 6 is not expected to produce significant impacts in the long term due to the assumption of frequent field observations of resource problems with rapid mitigation implementation to reduce/eliminate those problems.

Alternatives 4 and 7: Implementation of Alternatives 4 and 7 cumulatively impacts aquatic/riparian plant communities and the sensitive/watchlist species dependent on them. Those impacts are not considered significant in the short or long term. Alternatives 4 and 7 proposed fewer additions to the National Forest Transportation System within 100 feet of riparian vegetation and propose fewer perennial and intermittent crossings than Alternatives 1, 2, 5, and 6. Alternatives 4 and 7 also allow motorized use on fewer miles within 100 feet of riparian vegetation and have less motorized perennial and intermittent crossings than Alternatives 1, 2, 5, and 6. Alternatives 4 and 7 reduce motorized use by about 90 percent of the perennial and intermittent water crossings and reduce about 88 percent of the miles of motorized use located within 100 feet of riparian vegetation.

Implementation of Alternative 4 would not continue to impact *Bruchia bolanderi* and the seep along TKN-J5; *Ivesia sericoleuca*, a spring, and aspen along TKN-M2; or aspen along TKS-11, SV-005, or SV-P8. Alternative 4 does not propose adding TKN-J5, TKN-M2, TKS-11, SV-005, or SV-P8 to the NFTS. However, aspen along SV-P14 would continue to be impacted. In addition, implementation of Alternative 4 would not spread cheatgrass along TKN-M2 through motorized vehicle use since motorized use of that motorized trail would be prohibited. Alternative 7 would continue to impact *Bruchia bolanderi* and the seep along TKN-J5. Alternative 7 would not impact *Ivesia sericoleuca*, a spring and aspen along TKN-M2, or continue to spread cheatgrass along TKN-M2. Alternative 7 would continue to impact aspen along TKS-11, SV-P8, and SV-P14. Cross country travel by motorized vehicle users would not occur as

compared to Alternative 1. Alternatives 4 and 7 are not expected to produce significant impacts in the short or long term due to the assumption of frequent field observations of resource problems with rapid implementation of mitigations to reduce/eliminate those problems.

Alternative 3: Implementation of Alternative 3 would cumulatively impact aquatic/riparian plant communities and those sensitive/watchlist species dependent on them through use of system routes. Since implementation of Alternative 3 does not add any new motorized trails to the NFTS and prohibits cross country travel - it is not expected to add to direct or indirect impacts to aquatic/riparian plant communities and the sensitive/watchlist species dependent on them. Implementation of Alternative 3 would not continue to impact *Bruchia bolanderi* and the seep along TKN-J5; *Ivesia sericoleuca* and aspen along TKN-M2; or aspen along TKS-11, SV-005, SV-P8, and SV-P14 since those motorized trails would have motorized use prohibited. Implementation of Alternative 3 would not spread cheatgrass along TKN-M2 through motorized vehicle use. Implementation of Alternative 3 provides the greatest benefit to aquatic/riparian plant communities and those sensitive/watchlist species dependent on them.

Implementation of the action alternatives could impact *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium lunaria*, *Botrychium minganense*, *Botrychium montanum*, *Bruchia bolanderi*, *Epilobium howellii*, *Fissidens aphelotaxifolius*, *Helodium blandowii*, *Hydrothyria venosa*, *Ivesia aperta* var. *aperta*, *Ivesia aperta* var. *canina*, *Ivesia sericoleuca*, *Ivesia webberi*, *Meesia triquetra*, *Meesia uliginosa*, or *Pyrrocoma lucida* but would not contribute to a trend for listing them as threatened or endangered. Implementation of the action alternatives could also impact *Androsace occidentalis* var. *simplex*, *Darlingtonia californica*, *Drosera anglica*, *Drosera rotundifolia*, *Juncus marginatus* var. *marginatus*, *Meesia longiseta*, *Mimulus lacinatus*, *Potamogeton filiformis*, *Rhynchospora alba*, *Rhynchospora capitellata*, *Scutellaria galericulata*, *Sphagnum* species, *Utricularia minor*, V*eronica cusickii*, special aquatic features and aspen groves but those impacts are not expected to be significant in the short or long term. Since it is assumed that motorized vehicle users will stay on designated roads and trails regardless of the alternative selected, and motorized vehicle use does not benefit aquatic/riparian plant communities, the alternative with the least number of miles within aquatic/riparian plant communities is the most beneficial to those plant communities and the resources dependent on them.

Serpentine and/or Copper/Heavy Metal Plant Communities

1. Prohibition of cross country travel

Indicator(s) used to measure effects:

- Acres of serpentine/copper/heavy metal plant communities where cross country travel is prohibited.

No Action: Alternative 1 does not prohibit cross country travel on 13,400 acres of serpentine soils that contain 35 miles of motorized trails un-authorized for motorized use. Under implementation of Alternative 1 as yet undiscovered sensitive/watchlist species occurrences dependent on serpentine/copper/heavy metal plant communities would be at risk as new motorized trails were created. It is expected that cross country use would damage at least some sensitive/watchlist species occurrences

(if they are present on TNF system lands) and it is reasonable to expect that some occurrences would be lost.

Direct and indirect impacts could be significant at least at the local, site specific level and include killing and/or injuring sensitive/watchlist species primarily through cross country travel. Cross country use would also damage other native vegetation in these plant communities increasing the risk of erosion. The significance of direct and indirect impacts is dependent on many factors including the amount of disturbance, the sensitive/watchlist species being impacted, and in some cases, the season when the disturbance takes place. The significance of impacts is also dependent on the number of sensitive/ watchlist species that occur in a specific location and how many of them are damaged. Some sensitive species have not been found on the TNF, such as *Mielichhoferia elongata* and *Monardella follettii*. If they were found on TNF system lands in/along motorized trails un-authorized for motorized use, the occurrence would be considered an important range extension of the species and disturbances could be considered significant.

TNF system lands contain about 14,412 acres of serpentine plant community. Cross country travel is currently prohibited on about 1,012 of the 14,412 acres. About 1660 acres of these plant communities are impacted by roads and motorized trails. No sensitive or watchlist species have been found in the surveys of about 62 miles of motorized trails un-authorized for motorized use. The TNF has 35 miles of motorized trails un-authorized for motorized use and 58 miles of NFTS located within these plant communities.

Action alternatives: All of the action alternatives prohibit cross country travel on 13,400 acres containing 35 miles of motorized trails un-authorized for motorized use. All of the action alternatives prohibit travel on some portions of the 35 miles of motorized trails un-authorized for motorized use. Therefore, direct/indirect impacts to sensitive/watchlist species dependent on serpentine/copper/heavy metal plant communities from cross country travel would not occur. Motorized trails un-authorized for motorized use are considered an expression of cross country travel.

2. Additions to the National Forest Transportation System (NFTS)

Indicator(s) used to measure effects:

- Miles of proposed additions to the NFTS that pass through serpentine (ultra mafic) soils.
- Miles of proposed additions to the NFTS that are located within 100 feet of sensitive/watchlist plants and/or weed occurrences.

Areas of copper/heavy metal soils are usually small and not identified as distinct soil mapping units. Therefore, the miles of unsurveyed proposed motorized trail in copper and heavy metal areas are not known. Areas of copper/heavy metal are identified during on the ground surveys. For this analysis, the sensitive/watchlist species with potential habitat in copper/heavy metal areas are represented by miles within serpentine plant communities.

No Action: Alternative 1 does not add motorized trails to the NFTS. Refer to Table 3.06-10 which shows the miles of motorized trail within these plant communities by alternative. Implementation of Alternative 1 could also directly and indirectly impact sensitive and/or watchlist species through use of about 58 miles of NFTS located within these plant communities. Unknown occurrences of serpentine dependent sensitive and watchlist plants may occur along NFTS roads and trails. Impacts along NFTS

roads and trails could be direct – especially within the 30 foot band along either side of the motorized road or trail, and indirect – primarily from dust and increased risk of weed introduction and spread. Direct and indirect impacts could be significant dependent on the species of plant.

Surveys of about 62 miles of motorized trails un-authorized for motorized use have been completed to date. As noted above, no serpentine dependent sensitive or watchlist species were found in those surveys. In addition, no weed occurrences were found within 100 feet of serpentine/copper/heavy metal plant community during those surveys.

Table 3.06-10. Miles* of Motorized Use within Serpentine Plant Communities by Alternative

Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Existing NFTS roads and motorized trails	48	48	48	48	48	48	48
Private/other jurisdiction roads	12	12	12	12	12	12	12
Cross country travel (acres)	13,400	0	0	0	0	0	0
Motorized trails un-authorized for motorized use (miles)	35	0	0	0	0	0	0
Additions to the NFTS	0	4	0	2	4	3	3
Total Motorized	**94**	**64**	**59**	**62**	**64**	**63**	**63**

*Miles are approximate

Action Alternatives: Alternatives 2 and 5 propose the most additions to the NFTS in these plant communities - 4 miles. Therefore, implementation of Alternatives 2 and 5 have the greatest risk of negative impacts to sensitive/watchlist species dependent on serpentine/copper/heavy metal plant communities of the action alternatives. However, all Alternative 2 motorized trails will be surveyed in FY 2008 and any sensitive/watchlist occurrences discovered will have mitigations implemented to reduce/eliminate direct impacts to them. Surveys of the Maintenance Level 1 and temporary roads proposed as additions to the NFTS as motorized trails under Alternative 5 do not have current surveys. Serpentine dependent sensitive/watchlist species could occur along these roads that would go undetected. Therefore, the risk of impacts to sensitive/watchlist species is less in Alternative 2 than in Alternative 5. Sensitive/watchlist plant occurrences found in the FY 2008 surveys will be protected from the direct impacts of motorized vehicles, but not indirect impacts. Indirect impacts such as covering them in dust and increased risk of weed introduction and spread would still occur.

Alternatives 6 and 7 both propose the addition of about 3 miles of motorized trails to the NFTS within these plant communities and do not propose the Management Level 1 and temporary roads without current surveys that are proposed in Alternative 5. Alternative 4 proposes the addition of 2 miles of motorized trail in these plant communities. Alternative 3 does not propose the addition of any motorized trail within serpentine plant communities and therefore provides the greatest benefit to native serpentine vegetation including sensitive and watchlist species.

3. Cumulative effects including reasonably foreseeable

The spatial boundary of the cumulative effects analysis area is the Tahoe National Forest.

Indicator(s) used to measure effects: Past/present/reasonably foreseeable future actions that could potentially impact serpentine/copper/heavy metal plant communities as well as the sensitive/watchlist

species dependent on them, including the benefits from prohibiting use of motorized trails un-authorized for motorized use are discussed. It is assumed that all of the action alternatives avoid significant long term cumulative impacts by implementing frequent evaluation of routes, implementing mitigations to reduce impacts to sensitive/watchlist species, and conducting annual weed detection surveys with rapid treatment of weeds. This motorized trail evaluation combined with rapid mitigation of resource damage avoids significant impacts to serpentine/copper/heavy metal plant communities and the sensitive/watchlist species dependent on them in the short and long term.

Past: Serpentine habitats in the Sierra Nevada have been reduced in area and/or have had their functions impaired. Gold mining, timber harvest, road construction, recreational uses, and gravel mining are a few of the management activities that have impacted the serpentine habitats on the TNF. Serpentine habitats are frequently open terrain (Kruckeberg 1984). Therefore they lack vegetation to prevent cross country travel by OHVs. *Allium sanbornii* var. *congdonii, Allium sanbornii* var. *sanbornii, Chlorogalum grandiflorum, Mielichhoferia elongata, Monardella follettii* and *Perideridia bacigalupi* are the sensitive/watchlist species that are considered dependent on serpentine/copper/heavy metal habitats. Historic activities have cumulatively reduced the quality of serpentine habitat that would be suitable for these plants within TNF watersheds. The amount of reduction is unknown.

Current: Current management (2004 on) has added to cumulative impacts to serpentine/copper/heavy metal plant communities primarily through continued mining operations, utility corridor maintenance, and motorized vehicle use. Current management for sensitive/watchlist species being negatively impacted by motorized vehicle use has involved blocking the access with wooden and/or rock barriers. This method has not always been effective. This method is most effective when vegetation is available to also help block access. This analysis assumes that users will stay on NFTS roads and motorized trails.

Special uses projects such as utility corridor construction and maintenance pass through and impact many different types of plant communities including serpentine/copper/heavy metal. Mining/minerals projects are also known to impact serpentine/copper/heavy metal plant communities - and eliminate significant amounts of vegetation in some areas. Livestock do not usually spend much time in serpentine/copper/heavy metal plant communities due to the lack of forage and canopy to provide shade.

Reasonably foreseeable: Serpentine plant communities are cumulatively impacted when past impacts and the impacts of implementing the alternatives are added to the impacts of those actions identified in Table 3.00-1.

Generally, fuel reduction/timber harvest activities are not implemented on serpentine/copper/heavy metal soils due to the lack of vegetation in those plant communities. However, disturbance adjacent to these plant communities could change the hydrology of the serpentine/copper/heavy metal plant communities (in the short term), cause increased erosion and introduce weeds. These impacts could be locally significant and may be regionally significant over the long term since serpentine/copper/heavy metal plant communities are limited in distribution and are known to have a high number of endemic plants. None of the fuel reduction/timber harvest projects displayed in Table 3.00-1 are known to be located immediately adjacent to serpentine/copper/heavy metal plant communities.

Projects designed to improve the health of specific aquatic/riparian plant communities by restoring the hydrology of areas such as the Carmen project and others designed to improve the reproduction of aspen clones by removing conifers - such as the Carvin and Brumby projects do not significantly impact serpentine/copper/heavy metals plant communities.

No Action: Implementation of Alternative 1 carries a high risk of cumulative impacts to sensitive/watchlist species dependent on serpentine/copper/heavy metal plant communities. Alternative 1 has the most miles of motorized vehicle use within serpentine/copper/heavy metal plant communities (94 miles) and does not prohibit cross country travel. Since these plant communities are frequently open terrain (Kruckeberg 1984) and lack vegetation to prevent cross country travel by motorized vehicles, the risk of resource damage from cross country travel is high.

When the impacts of all past, current and reasonably foreseeable management actions are added to the possible impacts of cross country travel, implementation of Alternative 1 has the potential to significantly impact serpentine/copper/heavy metal plant communities and the sensitive/watchlist species dependent on them. Implementation of Alternative 1 may impact *Mielichhoferia elongata* and *Monardella follettii* if they occur on the unsurveyed potential habitat and may contribute to a trend for listing them as federally listed as threatened or endangered over the short or long term. Neither species has been found on TNF system lands. Therefore discovering either species on the TNF would make them important occurrences and impacts to them could be significant. Implementation of Alternative 1 may also impact *Allium sanbornii* var. *congdonii*, *Allium sanbornii* var. *sanbornii*, *Chlorogalum grandiflorum*, and *Perideridia bacigalupi* but those impacts are not considered significant at this time unless entire occurrences are negatively impacted. Since vegetative cover on serpentine plant communities is generally sparse, cross country travel could negatively impact entire occurrences if they exist in the unsurveyed potential habitat. Refer to Appendix J (Biological Evaluation for Sensitive Plants and Fungi) and Appendix N (Watchlist Plant and Plant Community Report) more discussion of the past, current and reasonably foreseeable actions that contribute to cumulative impacts to serpentine/copper/ heavy metal plant communities. Over the long term, with cross country travel and other continued disturbances, some of the serpentine plant communities may lose significant amounts of vegetation and experience increased erosion. This could be locally significant and may be regionally significant over the long term since serpentine plant communities/areas of copper/heavy metals are limited in distribution and are known to have a high number of endemic plants.

Action Alternatives: All action alternatives would reduce the number of motorized trails un-authorized for motorized use in serpentine/copper/heavy metal plant communities. However, implementation of the action alternatives could cumulatively impact sensitive/watchlist species dependent on serpentine/copper/heavy metal plant communities. Surveys to date have not detected any sensitive/watchlist species along proposed additions to the NFTS that are serpentine/copper/heavy metal plant community dependent. However, some of the unsurveyed motorized trails pass through serpentine soils that have not yet been surveyed (YRN-7 and YRN-M2).

None of the reasonably foreseeable actions listed in Table 3.00-1 are expected to significantly impact serpentine/copper/heavy metal plant communities because the reasonably foreseeable projects listed are not located within or immediately adjacent to serpentine plant communities. Refer to the discussion of

impacts to serpentine plant communities under the no action alternative. The action alternatives propose 8 motorized trails that pass through serpentine soils. Two of the 8 are NFTS Maintenance Level 1 roads or temporary roads proposed under Alternative 5 only. The other motorized trails are identified as: ARM-2, ARM-3r, YRN-509, YRN-7, and YRN-M2.

Alternatives 2 and 5: Cumulative impacts from implementations of Alternatives 2 and 5 are not considered significant. Of the action alternatives, implementation of Alternatives 2 and 5 propose the most miles of additions to the NFTS in these plant communities. Therefore, implementation of Alternatives 2 and 5 have the greatest risk of cumulatively impacting sensitive species dependent on serpentine/copper/heavy metal plant communities of the action alternatives. The risk of cumulative impacts is higher in Alternative 5 than in Alternative 2 because the NFTS Maintenance Level 1 roads and temporary roads proposed as additions to the NFTS as motorize trails under Alternative 5 do not have current surveys. Therefore, the risk of cumulatively impacting occurrences of sensitive/watchlist plants dependent on these plant communities (should they occur in the unsurveyed habitat) is less in Alternative 2 than in Alternative 5. All serpentine/cooper/heavy metal dependent sensitive/watchlist plants will have mitigations implemented to reduce and/or eliminate impacts from motorized vehicles when they are discovered. Occurrences could go undetected under implementation of Alternative 5 along the proposed roads that do not have recent botanical surveys.

Alternatives 6 and 7: Cumulative impacts from implementation of Alternatives 6 and 7 are not considered significant. Alternatives 6 and 7 both propose the addition of about 3 miles of motorized trail within these plant communities and do not propose adding NFTS Maintenance Level 1 or temporary roads to the NFTS. Alternative 6 and 7 prohibit use of 32 miles of motorized trails un-authorized for motorized use within these plant communities. Sensitive/watchlist plant occurrences would be indirectly impacted, but would have mitigations implemented to reduce/eliminate direct impacts to them under implementation of Alternatives 6 and 7 (should they occur in the unsurveyed habitat). Therefore, implementation of Alternatives 6 and 7 could indirectly and cumulatively impact *Mielichhoferia elongata* and *Monardella follettii* if they occur on the unsurveyed potential habitat, but would not contribute to a trend for federally listing them as threatened or endangered. Implementation of Alternatives 6 and 7 may also indirectly and cumulatively impact *Allium sanbornii* var. *congdonii*, *Allium sanbornii* var. *sanbornii*, *Chlorogalum grandiflorum*, and *Perideridia bacigalupi* but those impacts are not considered significant at this time unless entire occurrences are negatively impacted.

Alternatives 3 and 4: Cumulative impacts from implementation of Alternatives 3 and 4 are not considered significant. Alternative 4 proposes the addition of 2 miles of motorized trail and prohibits cross country travel in these plant communities. Alternative 4 proposes ARM-3r. Alternative 3 does not propose the addition of any motorized trails to the NFTS and would prohibit use on all 35 miles of motorized trails un-authorized for motorized use located within serpentine/copper/heavy metal plant communities. Therefore, implementation of Alternatives 3 and 4 may cumulatively impact *Mielichhoferia elongata* and *Monardella follettii*, but would not contribute to a trend for federally listing them as threatened or endangered. Implementation of Alternative 3 may also impact *Allium sanbornii* var. *congdonii*, *Allium sanbornii* var. *sanbornii*, *Chlorogalum grandiflorum* and *Perideridia bacigalupi* if they

occur along NFTS roads and trails but those impacts are not considered significant in the short or long term unless entire occurrences are eliminated.

Implementation of the action alternatives may indirectly and cumulatively impact *Mielichhoferia elongata* and *Monardella follettii* if they occur on the unsurveyed potential habitat, but would not contribute to a trend for listing them as federally listed as threatened or endangered over the short or long term. Implementation of the action alternatives may also indirectly and cumulatively impact *Allium sanbornii* var. *congdonii*, *Allium sanbornii* var. *sanbornii*, *Chlorogalum grandiflorum*, and *Perideridia bacigalupi* but those impacts are not considered significant at this time unless entire occurrences are negatively impacted.

Older Forest Plant Communities

1. Prohibition of cross country travel

Indicator(s) used to measure effects:

- Acres of older forest plant communities where cross country travel is prohibited.

No Action: Implementation of Alternative 1 would directly, indirectly, and cumulatively impact older forest plant communities and the sensitive species dependent on them**.** (There are currently no watchlist plants or plant communities dependent on older forests.) Alternative 1 does not prohibit cross country travel on 330,200 acres which includes 627 miles of motorized trails un-authorized for motorized use. Under implementation of Alternative 1 as yet undiscovered sensitive species occurrences dependent on older forest plant communities would be at risk as new motorized trails were created. It is expected that cross country use would damage at least some sensitive species occurrences (if they are present on TNF system lands) and it is reasonable to expect that some occurrences would be lost even though older forest plant communities are not considered open terrain.

There are about 353,631 acres of older forest on TNF system lands, of which 29,900 acres or about 9 percent are currently, impacted by motorized vehicle use. This acreage number was obtained using about 100 feet on either side of motorized trails that pass through vegetation mapped as CWHR 4 and above on NFS lands. The significance of 9 percent disturbance is unknown.

Direct impacts to sensitive species dependent on older forest plant communities from implementation of Alternative 1 could be significant at least at the local, site specific level. Cross country use could kill and/or injure these older forest dependent sensitive species directly, and indirectly kill or injure them through soil changes and the introduction and spread of weeds. Cross country use would also damage other native vegetation in these plant communities increasing the risk of erosion and possibly damaging mycorrhizal networks. The significance of direct impacts is dependent on many factors including the amount of disturbance, the sensitive species being impacted, and in some cases, the season when the disturbance takes place. The significance of impacts is also dependent on the number of sensitive species that occur in a specific location and how many of them are damaged.

Cypripedium fasciculatum is an older forest dependent species on the TNF. Several occurrences of *Cypripedium fasciculatum* are currently impacted by maintenance of system roads. In addition, NFTS roads have provided access to *Cypripedium fasciculatum* occurrences which has contributed to poaching

of these plants (plants have been dug up and removed). Over the long term, cross country motorized vehicle could eventually kill significant numbers of these plants and occurrences could be lost. In addition, introduction of weeds could eventually eliminate the occurrences. Nonnative blackberries have been introduced near the roadside occurrences of this orchid in the Rock Creek area. This aggressive weed could eventually displace the orchids in this area. Implementation of Alternative 1 could significantly impact occurrences of *Cypripedium fasciculatum* over the long term.

Cross country impacts to older forest plant communities containing sensitive species would be considered significant. It is impossible to know when or where cross country motorized vehicle use would occur, so these disturbances are difficult to quantify. Since Alternative 1 does not prohibit cross county travel, the risk of significant impacts to sensitive species that may occur within unsurveyed potential habitats and within known occurrences is higher than the action alternatives. Reducing and/or eliminating impacts to sensitive species are considered effective methods of reducing cumulative impacts to them. However, flag and avoid is not a practical mitigation when cross country travel is not prohibited. Not prohibiting cross country travel on 330,200 acres including 627 miles of motorized trails un-authorized for motorized use greatly increases the risk of negative indirect impacts to sensitive species.

Action Alternatives: All of the action alternatives prohibit cross country travel 330,200 acres including 627 miles of motorized trails un-authorized for motorized use. (All of the action alternatives prohibit use of some portion of the 627 miles of motorized trail un-authorized for motorized use.) Therefore, direct/indirect impacts to sensitive species dependent on older forest plant communities from cross country travel would not occur. Refer to Table 3.06-11.

2. Additions to the National Forest Transportation System (NFTS)

Indicator(s) used to measure effects:

- Miles of motorized trails un-authorized for motorized use proposed to be added to the NFTS system within older forest plant communities. The miles of proposed additions of motorized trails to the NFTS that pass through older forests (CWHR 4 and above) is the indicator used to analyze impacts to unsurveyed older forest habitats. Table 3.06-11 displays the number of miles of motorized trails to be added to the NFTS in older forest plant communities by alternative.
- Sensitive species (associated with older forests) located within 100 feet of proposed motorized trail additions to the NFTS. Surveys to date have shown that *Cypripedium fasciculatum* is located within 30 feet of several NFTS roads.
- Weed occurrences located within 100 feet of proposed motorized trail additions to the NFTS. Surveys to date have identified Himalayan blackberry along a NFTS road that is within about 200 feet of an occurrence of *Cypripedium fasciculatum*.

Table 3.06-11. Miles* of Motorized Use within Older Forest Plant Communities by Alternative

Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Existing NFTS roads and motorized trails	1,088	1,088	1,088	1,088	1,088	1,088	1,088
Private/other jurisdiction roads	220	220	220	220	220	220	220
Cross country travel (acres)	330,200	0	0	0	0	0	0
Motorized trails un-authorized for motorized use (miles)	627	0	0	0	0	0	0
Additions to the NFTS	0	36	0	17	141	33	22
Subtotal Motorized	**1934**	**1344**	**1308**	**1325**	**1449**	**1341**	**1330**

*Miles are approximate

No Action: Alternative 1 does not add motorized trails to the NFTS. Refer to Table 3.06-12 which shows the miles of motorized trail within these plant communities by alternative. Implementation of Alternative 1 could also directly impact sensitive species through use of about 1088 miles of existing NFTS roads and trail located within these plant communities. Direct and indirect impacts could be significant.

Surveys of about 62 miles of motorized trails un-authorized for motorized use have been completed to date. Sensitive species dependent on older forests were not found in those surveys. No new weed occurrences were found in older forest plant communities in these surveys.

Action Alternatives: Implementation of Alternative 5 proposes the most miles of additions to the NFTS in these plant communities – 141 miles. Therefore, implementation of Alternative 5 has the greatest risk of negative impacts to sensitive species dependent on older plant communities of the action alternatives. These are primarily indirect impacts from dust and increased weed introduction and spread. Since Alternative 5 proposes adding existing NFTS Maintenance Level 1 and temporary roads which do not have current botanical surveys, there is a risk that older forest dependent species will be directly impacted along those routes. Sensitive plant occurrences found in the FY 2008 surveys will be protected (impacts will be reduced and/or eliminated) from the direct impacts of motorized vehicles. Indirect impacts such as covering them in dust and increased risk of weed introduction and spread would still occur. However, if these plants occur within 30 or 100 feet of the motorized trails without current botanical surveys that are proposed in Alternative 5 (refer to the alternative description in Chapter 2 for a listing) they will remain undetected and will continue to be directly and indirectly impacted.

Alternative 2 proposes to add 36 miles of motorized trails to the NFTS in older forest plant communities. Alternative 6 would add 33 miles, Alternative 7 – 33 miles, and Alternative 4 – 17 miles. All sensitive plant occurrences found in the FY 2008 surveys (as mentioned earlier none were found in the FY 2007 surveys) will have actions implemented to reduce and/or eliminate direct impacts from motorized vehicles. If occurrences are found on or along motorized trails proposed in Alternatives 2, 4, 6, or 7; they will be indirectly impacted through dust and increased risk of weed introduction and spread. Refer to the Weed Risk Assessment located in Appendix M of the DEIS for more information about weed introduction and spread.

Alternative 3 does not propose the addition of any motorized trails to the NFTS within older forest plant communities. Implementation of Alternative 3 would not directly or indirectly impact sensitive species.

3. Cumulative effects including reasonably foreseeable

The spatial boundary of the cumulative effects analysis area is the Tahoe National Forest.

Indicator(s) used to measure effects: Past/present/reasonably foreseeable future actions that could potentially impact older forest plant communities and the sensitive species dependent on them as well as the benefits from closing motorized trails un-authorized for motorized use are discussed. It is assumed that all of the action alternatives avoid long term cumulative impacts by implementing frequent evaluation of routes, implementing mitigations to reduce impacts to sensitive species, and conducting annual weed detection surveys with rapid treatment of weeds. This motorized trail evaluation combined with rapid mitigation of resource damage avoids significant impacts to older forest plant communities and the sensitive species dependent on them in the short and long term.

Past: Many older forest plant communities in the Sierra Nevada have been directly removed or have had their functions impaired. Late-successional older forests of middle elevations (westside mixed conifer, red fir, white fir, eastside mixed conifer, and eastside pine types) at present constitute 7 to 30 percent of the forest cover, depending on forest type (Sierra Nevada Ecosystem Project 1996). It is reasonable to expect that the native plant (and animal) species dependent on older forest plant communities have also experienced a decline in range and population viability since pre-settlement times. For example, sensitive fungi are dependent on specific vegetation (hosts) and certain amounts of leaf litter/duff. These habitat components for fungi have been historically reduced and/or eliminated through the removal of vegetation and alteration of older forest plant communities. In addition, the underground mycelial network has been broken through the creation of openings such as clearcuts and roads. Past management activities have cumulatively reduced the amount of older forest within TNF watersheds that would be suitable habitat for: *Cudonia monticola, Cypripedium fasciculatum, Cypripedium montanum, Dendrocollybia racemosa,* and *Phaeocollybia olivacea*. The amount of reduction is unknown. Motorized vehicle use has added to the cumulative impacts to older forest plant communities.

Current: In this analysis, older forest is described as occurring in the red fir/upper montane forest and mixed-conifer forest. Other vegetation types exist that also have older trees, but mixed conifer and red fir are the primary types of older forest analyzed in this document. For more information about old forests, refer to the SNFPA (2001).

As mentioned previously, there are about 353,600 acres of older forest on TNF system lands, of which 29,900 acres or about 9 percent are currently, impacted by motorized vehicle use. This acreage number was obtained using about 100 feet on either side of motorized vehicle roads and trails that pass through vegetation mapped as CWHR 4 and above on NFS lands. The significance of this percentage is unknown. Refer to the wildlife Biological Evaluation located in Appendix L of the DEIS for a discussion of cumulative effects to older forest dependent animal species. Effects (that contribute to cumulative effects primarily from use of system routes) to known occurrences of the older forest dependent sensitive plant species – *Cypripedium fasciculatum* are discussed below.

There are 6 known *Cypripedium fasciculatum* occurrences within the TNF boundary. One of the 6 known occurrences on TNF system lands, one occurrence contains only 3 plants (Lafayette Ridge occurrence). Of the remaining 5 known occurrences on TNF system lands, 4 are being indirectly impacted by dust and have an increased risk of weed infestation due to motorized vehicle use of the existing NFTS roads and trails. *Cypripedium fasciculatum* occurrences are known to be located along the 25-28 road (50 plants directly above the road), the Rock Creek road (less than 30 plants some located directly adjacent to the road), the Madrone Springs road (about 20 plants located on the road cut bank), and the largest occurrence (about 350 plants) located at the end of a road near Old Condon Mill. (Note that the 25-28 road is analyzed for decommissioning in the Canyon Project – FY 2008.)

Special uses projects such as utility corridor construction and maintenance, mining operations, and livestock grazing are all ongoing projects that are not known to impact known occurrences of *Cypripedium fasciculatum*.

Reasonably foreseeable: Over the long term, with continued disturbance, older forest plant communities will continue to be fragmented through implementation of current and reasonably foreseeable management actions. In general terms, motorized vehicle use of NFTS motorized roads and trails create linear disturbances. As mentioned previously, there are 1,088 miles of NFTS roads and trails on TNF lands. The impacts of linear disturbances within older forest plant communities are not fully studied. The fuel reduction/timber harvest activities identified in Table 3.00-1 impact older forests but must retain some older forest characteristics due to SNFPA direction for maintenance of specific canopies and retention of larger trees. Reasonably foreseeable project other than fuel reduction/timber harvest have little impact older forest plant communities.

No action: Implementation of Alternative 1 cumulatively impacts older forest plant communities. When past impacts and the impacts of implementing Alternative 1 are added to the impacts of those actions identified in Table 3.00-1, those impacts could be significant. Alternative 1 does not prohibit cross country travel on 330,200 acres including 627 miles of motorized trails un-authorized for motorized located in older forest plant communities. Older forests are not considered sparsely vegetated and the ability to drive across the terrain is somewhat limited. However, surveys to date have shown that motorcycles are not limited in their ability to drive cross country through older forest plant communities. Refer to the project files and the survey records of specific routes.

When the impacts of all past, current and reasonably foreseeable management actions are added together, the possible impacts of cross country travel including use of motorized trails un-authorized use and NFTS roads and trails within older forests has the potential to significantly impact older forests and the sensitive species dependent on them over the long term (5 years plus). The majority of the known older forest dependent *Cypripedium fasciculatum* plants are currently being indirectly impacted by dust from use of NFTS roads and trails – estimated at about 90 percent. The significance of this indirect impact (dust) is unknown. In addition, one of the known occurrences of *Cypripedium fasciculatum* is currently at risk of Himalayan blackberry infestation (blackberries within 100 feet of individual plants). One of the biggest impacts of disturbance of any kind is the introduction and spread of weeds. Refer to Appendix M (Weed Risk Assessment) of the DEIS for more discussion of how weeds are introduced and spread within older forest plant communities.

Implementation of Alternative 1 could impact *Cudonia monticola, Cypripedium fasciculatum, Cypripedium montanum, Dendrocollybia racemosa,* and *Phaeocollybia olivacea*. Impacts to the sensitive fungi: *Cudonia monticola, Dendrocollybia racemosa,* and *Phaeocollybia olivacea* would not contribute to a trend for federal listing because the ESA does not apply to fungi. Impacts to *Cypripedium fasciculatum* and *Cypripedium montanum* could contribute to a trend toward federal listing over the long term primarily due to cross country travel.

Action Alternatives: All action alternatives would reduce the number of miles open for motorized vehicles in older forest plant communities. However, implementation of the action alternatives could cumulatively impact sensitive species dependent on older forest plant communities. Surveys to date (about 62 miles) have not detected any sensitive species along proposed additions to the NFTS that s that are older forest plant community dependent. However, past management activities have cumulatively reduced the amount of older forest plant communities within TNF watersheds and use of the NFTS adds to those cumulative impacts. The significance of the addition of impacts to older forest plant communities from use of the NFTS to cumulative effects is unknown and is not being analyzed in this document other than the acknowledgement that use of the NFTS contributes to cumulative effects. Some of the unsurveyed motorized trails un-authorized for motorized use pass through older forest plant communities and may have sensitive species present. This is unknown until the surveys are complete. None of the reasonably foreseeable actions listed in Table 3.00-1 are expected to significantly impact older forest plant communities on their own because the reasonably foreseeable projects listed are not located within older forest plant communities and/or will retain the largest trees, large down wood, and will not significantly reduce canopy closure.

As mentioned previously, older forest plant communities in the Sierra Nevada have been directly removed or have had their functions impaired. Given the past history of the Sierra Nevada's, it is reasonable to expect that the plant and fungi species dependent on older forest conditions have experienced a significant decline in range and population viability since pre-settlement times (although this assumption is unproven).

Alternative 5: Implementation of Alternative 5 cumulatively impacts older forest plant communities and the sensitive species dependent on them. Implementation of Alternative 5 has the greatest number of miles of proposed additions to the NFTS located within older forest plant communities of all of the action alternatives. Management Level 1 and temporary roads proposed in Alternative 5 do not have current botanical surveys and may have occurrences of sensitive species and weeds. Occurrences of sensitive/watchlist species along these roads may be experiencing negative impacts from motorized vehicle use. Therefore implementation of Alternative 5 has the greatest risk of negatively impacting older forest plant communities and the sensitive species dependent on them. The significance of possible impacts is dependent on the sensitive species and the amount of impact.

Alternatives 2 and 6: Implementation of Alternatives 2 and 6 could cumulatively impact *Cudonia monticola, Cypripedium fasciculatum, Cypripedium montanum, Dendrocollybia racemosa,* and/or *Phaeocollybia olivacea* primarily through dust and increased risk of weed introduction and spread. Those impacts are not considered significant even when added to past, current, and reasonably foreseeable future management actions because all motorized trails proposed in these alternatives will be surveyed and

impacts to sensitive species will be mitigated. The risk of negative impacts due to implementation of Alternatives 2 and 6 is less than under implementation of Alternative 1 due to the prohibition of cross country travel. As described above, Alternative 2 proposes the addition of 36 miles of motorized trails to the NFTS and Alternative 6 proposes 33 miles. Both alternatives prohibit use on about 94-95 percent of the motorized trails un-authorized for motorized use located within older forest plant communities.

Alternatives 4 and 7: Implementation of Alternatives 4 and 7 could cumulatively impact *Cudonia monticola, Cypripedium fasciculatum, Cypripedium montanum, Dendrocollybia racemosa,* and/or *Phaeocollybia olivacea* primarily through dust and increased risk of weed introduction and spread. Those impacts are not considered significant even when added to past, current, and reasonably foreseeable future management actions because all motorized trails proposed in these alternatives will be surveyed and impacts to sensitive species will be mitigated. The risk of negative impacts due to implementation of Alternatives 4 and 7 is less than under implementation of Alternative 1 due to the prohibition of cross country travel. As described above, Alternative 4 proposes the addition of 17 miles of motorized trails un-authorized for motorized use to the NFTS and Alternative 7 proposes 22 miles. Both alternatives prohibit use on about 96-97 percent of the motorized trails un-authorized for motorized use located within older forest plant communities.

Alternative 3: Implementation of Alternative 3 could cumulatively impact *Cudonia monticola, Cypripedium fasciculatum, Cypripedium montanum, Dendrocollybia racemosa,* and/or *Phaeocollybia olivacea* primarily through dust and increased risk of weed introduction created by use of system routes. However, implementation of Alternative 3 has the least number of miles of motorized vehicle trail available for use within older forest plant communities and has the least risk of cumulative impacts to sensitive species that require older forest plant communities of all of the action alternatives. Alternative 3 does not propose additions to the NFTS and prohibits cross country travel.

Implementation of the action alternatives could impact *Cudonia monticola, Cypripedium fasciculatum, Cypripedium montanum, Dendrocollybia racemosa,* and *Phaeocollybia olivacea*. Impacts to the sensitive fungi: *Cudonia monticola, Dendrocollybia racemosa,* and *Phaeocollybia olivacea* would not contribute to a trend for federal listing because the ESA does not apply to fungi. Impacts to *Cypripedium fasciculatum* and *Cypripedium montanum* would not contribute to a trend toward federal listing over the long term primarily because all occurrences would have direct impacts from motorized vehicle use would be reduced and/or eliminated.

Oak Woodland Plant Communities

1. Prohibition of cross country travel

Indicator(s) used to measure effects:

- Acres of oak woodland where cross country travel is prohibited.

No Action: Implementation of Alternative 1 would directly, indirectly, and cumulatively impact oak woodland plant communities and the sensitive/watchlist species that may occur within them. Alternative 1 does not prohibit cross country travel on 13,500 acres of oak woodland plant communities containing 19 miles motorized trails un-authorized for motor use. Under implementation of Alternative 1 as yet undiscovered sensitive/watchlist species occurrences would be at risk as new motorized trails were

created. It is expected that cross country use would damage at least some sensitive/watchlist species occurrences (if they are present on TNF system lands) and it is reasonable to expect that some occurrences would be lost. Oak woodland plant communities are considered fairly open terrain.

There are about 13,886 acres of oak woodland on TNF system lands, with about 22 miles of NFTS Motorized roads and trails plus 19 miles of motorized trails un-authorized for motorized use located within them. There are about 386 acres of oak woodland that currently prohibit cross country travel.

Direct impacts to sensitive/watchlist species from implementation of Alternative 1 could be significant at least at the local, site specific level. Cross country use could kill and/or injure sensitive/watchlist species directly and indirectly kill or injure them through soil changes and the introduction and spread of weeds. Cross country use would also damage other native vegetation in these plant communities by increasing the risk of erosion. The significance of direct impacts is dependent on many factors including the amount of disturbance, the sensitive/watchlist species being impacted, and in some cases, the season when the disturbance takes place. The significance of impacts is also dependent on the number of sensitive/watchlist plants that occur in a specific location and how many of them are damaged. Currently there are no sensitive/watchlist species on the TNF list that are oak woodland plant community dependent. However, several of the sensitive/watchlist species on the TNF list could grow in oak woodlands.

Cross country impacts within oak woodland plant communities containing sensitive/watchlist species would be considered significant. It is impossible to know when or where cross country motorized vehicle use would occur, so these disturbances are difficult to quantify. Since Alternative 1 allows cross county travel, the risk of significant impacts to sensitive/watchlist species that may occur within unsurveyed potential habitats is higher than in the action alternatives. Reducing and/or eliminating impacts to sensitive/watchlist species are considered effective methods of reducing cumulative impacts to them. However, flag and avoid is not a practical mitigation when cross country travel is allowed. Allowing unrestricted motorized vehicle use across the forest greatly increases the risk of negative indirect impacts to sensitive/watchlist species.

Action alternatives: All of the action alternatives prohibit cross country travel. Therefore, direct impacts to sensitive/watchlist species within oak woodland plant communities from cross country travel would not occur. Refer to Table 3.06-12. Alternative 5 prohibits use on 17 of the 19 miles (90 percent) of motorized trails un-authorized for motorized use located within oak woodland plant communities. All of the other action alternatives (including Alternative 3) prohibit use on all of the 19 miles of motorized trails un-authorized for motorized use in oak woodlands.

2. Additions to the National Forest Transportation System (NFTS)

Indicator(s) used to measure effects:

- Miles of motorized trails proposed to be added to the NFTS system within oak woodland plant communities.
- Miles of motorized trail proposed for addition to the NFTS with sensitive/watchlist and/or weed occurrences located within 30 or 100 feet.

No Action: Alternative 1 does not propose the addition of motorized trails to the NFTS. Surveys of about 62 miles of motorized trail un-authorized for motorized use have been completed to date. No sensitive/watchlist species or new weed occurrences were found in oak woodlands during those surveys.

Table 3.06-12. Miles* of Motorized Use within Oak Woodland Plant Communities by Alternative

Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Existing NFTS roads and motorized trails	22	22	22	22	22	22	22
Private/other jurisdiction roads	19	19	19	19	19	19	19
Cross country travel (acres)	13,500	0	0	0	0	0	0
Motorized trails un-authorized for motorized use	19	0	0	0	0	0	0
Additions to NFTS	0	0	0	0	2	0	0
Subtotal Motorized	**60**	**41**	**41**	**41**	**43**	**41**	**41**

*Miles are approximate

Action Alternatives: All action alternatives would reduce the number of miles of motorized vehicles use in oak woodland plant communities. Refer to Table 3.06-12 which shows the miles of proposed additions to the NFTS within these plant communities by alternative. None of the action alternatives add significant numbers of miles of motorized trails un-authorized for motorized use to the NFTS. Alternative 5 proposes two miles of additions to the NFTS in these plant communities. Therefore, of the action alternatives, implementation of Alternative 5 has the greatest risk of negative indirect impacts to sensitive/watchlist species that may occur within oak woodland plant communities. Possible impacts would be primarily indirect impacts from dust and increased weed introduction and spread. In addition, many of the NFTS Maintenance Level 1 and temporary roads proposed under Alternative 5 do not have current botanical surveys and there is a risk that sensitive/watchlist species could be impacted if they occur along them. Alternatives 2, 4, 6, and 7 all add less than one mile of motorized trail to the NFTS (the numbers in Table 3.06-12 are rounded). This is less than one percent of the motorized trails un-authorized for motorized use located within oak woodlands. Alternative 3 does not propose the addition of any motorized trails to the NFTS within oak woodlands and would not directly impact sensitive/watchlist species through motorized vehicle use of those routes.

Sensitive/watchlist plant occurrences found in the FY 2008 surveys will be protected (impacts will be reduced and/or eliminated) from the direct impacts of motorized vehicles. Indirect impacts such as covering them in dust and increased risk of weed introduction and spread would still occur. However, if sensitive/watchlist species occur within 30 or 100 feet of the motorized trails without current surveys proposed in Alternative 5 they will remain undetected and will continue to be directly and indirectly impacted.

3. Cumulative effects including reasonably foreseeable

The spatial boundary of the cumulative effects analysis area is the TNF.

Indicator(s) used to measure effects: Past/present/reasonably foreseeable future actions that could potentially impact oak woodland plant communities and the sensitive species that may occur within them, as well as the benefits from closing motorized trails un-authorized for motorized use are discussed. It is

assumed that all of the action alternatives avoid long term cumulative impacts by implementing frequent evaluation of routes, mitigations implemented to reduce impacts to sensitive/watchlist species, and detection/treatment of weeds. This motorized trail evaluation combined with rapid mitigation of resource damage avoids significant impacts to oak woodlands plant communities and sensitive/watchlist species in the short and long term.

Past: As identified previously, California's oak woodlands have experienced extensive historic disturbance. No other ecosystem in the Sierra Nevada has experienced more human influence over a longer time period than the oak woodlands (Anderson in SNFPA 2001). The amount of oak woodland plant communities and their health has been reduced across the State.

Current: Motorized vehicles impact TNF oak woodlands by: introducing and spreading weeds, damaging native vegetation, increasing soil erosion, and fragmenting habitats. Refer to Table 3.06-13 for the number of miles of proposed additions to the NFTS by alternative. Other on going projects on the forest that impact oak woodlands include: special uses projects such as utility corridor construction and maintenance that pass through and impact oak woodlands; minerals operations that remove native vegetation and recontour the landscape; and livestock grazing projects. The TNF does not have any sensitive plants or fungi and/or any watchlist plants that are entirely dependent on oak woodlands. However, several sensitive plant species are known to occur in oak woodlands including *Clarkia biloba* ssp. *Brandegeae*.

Reasonably foreseeable: When the past and current impacts are added to the impacts of the reasonably foreseeable future actions identified in Table 3.00-1, risks to oak woodlands increase. Some of the oak woodland plant communities managed by the TNF are located in steep inner gorges. The TNF has some oak tree species that occur within mixed conifer plant communities - but mixed conifer plant communities are not considered oak woodlands. Even though mixed conifer plant communities are not oak woodlands, the oaks that occur within them are considered valuable resources. Therefore, some of the fuel reduction/timber harvest activities identified in Table 3.00-1 retain some oaks within mixed conifer plant communities and remove conifers allowing oaks to receive more light and nutrients – for example the Canyon Forest Health project. However, very few fuel reduction activities and no timber harvest activities occur in oak woodlands on the TNF. The biggest impact of disturbance of any kind within oak woodlands is the risk of introduction and spread of weeds.

No action: Implementation of Alternative 1 allows cross country use within TNF oak woodland plant communities and carries the greatest risk of negative impacts to those plant communities. There are no known occurrences of sensitive/watchlist species located within oak woodlands on TNF system lands. However, there is a high risk of weed infestation in these lower elevations. Cross country travel would spread weeds. Refer to Appendix M or the DEIS for the effects of weed infestation. In summary, weeds can displace sensitive/watchlist species if the weeds become established and spread within occurrences. Weed introduction and spread within sensitive/watchlist species occurrences is considered a significant long term impact. Therefore, when the impacts of all past, current and reasonably foreseeable management actions are added together, the possible impacts of cross country travel and use of motorized trails unauthorized for motorized use within oak woodlands has the potential to significantly impact sensitive/watchlist species over the long term (5 years plus). Any sensitive/watchlist species discovered

within oak woodlands in the FY 2008 surveys would have mitigations implemented to reduce and/or eliminate direct impacts. However, indirect impacts from dust and increased risk of weed introduction and/or spread would occur.

Action Alternatives: Compared to Alternative 1, all action alternatives would reduce the number of miles of motorized trail in oak woodlands. However, implementation of the action alternatives could cumulatively impact sensitive/watchlist species located within oak woodlands even though surveys to date (about 62 miles) have not detected any sensitive/watchlist species in them. Past management activities have cumulatively reduced the amount of oak woodland within TNF watersheds. Motorized vehicle use adds to the cumulative impacts to oak woodland plant communities, but the significance of those impacts is unknown.

Alternative 5: Compared to Alternative 1, implementation of Alternative 5 has less risk of negative impacts to sensitive plants/fungi and/or watchlist species within oak woodlands primarily because it prohibits cross country travel. Of the action alternatives, implementation of Alternative 5 carries the highest risk of negative impacts to oak woodland plant communities since it has the largest number of proposed additions to the NFTS. Alternative 5 proposes the addition of 7 motorized trails that do not have current botanical surveys for a total addition of 2 miles. However, compared to Alternative 1, Alternative 5 reduces cumulative impacts to oak woodland plant communities by prohibiting motorized use on about 90 percent of the motorized trails un-authorized for motorized use in these plant communities.

Alternatives 2, 3, 4, 6, and 7: These action alternatives propose the addition of less than mile of motorized trail to the NFTS within oak woodlands. These alternatives also prohibit motorized use on close to 100 percent of the motorized trails un-authorized for motorized use. Adding less than 1 mile of motorized trail to the NFTS is not considered a significant addition to cumulative impacts to oak woodlands or the sensitive/watchlist species that may be growing there. The less than one mile of motorized trail proposed for addition to the NFTS will be surveyed in FY 2008 and if sensitive/watchlist species are found, they will have mitigations implemented to reduce or eliminate direct impacts. Indirect impacts could still occur from dust and increased risk of weed introduction and spread.

Forest edges and openings

1. Prohibition of cross country travel

Indicator(s) used to measure effects:

- Acres of forest edge and opening plant communities where cross country travel is prohibited. (Note: there is overlap between these plant communities and aquatic/riparian, serpentine, older forest, and oak woodland plant communities. Therefore the acres and number of miles of motorized trails un-authorized for motorized use present in forest edge and openings plant communities contains some of the acres and miles shown in other plant communities and the totals from all plant communities do not add up to 1,400 miles.)

No Action: Implementation of Alternative 1 would directly, indirectly, and cumulatively impact the sensitive/watchlist species dependent on forest edges and openings. Over the long term (5 years plus) those impacts could be significant. Alternative 1 does not prohibit cross country travel on 498,700 acres

with 925 miles of motorized trails un-authorized for motorized use. Under implementation of Alternative 1 known and as yet undiscovered sensitive/watchlist species occurrences would be at risk as new motorized trails were created. It is expected that long term cross country use could damage at least some sensitive/watchlist species occurrences and it is reasonable to expect that some occurrences would be lost.

The TNF has about 543,300 acres of forest edges and openings. Forest edge and opening plant communities currently contain about 1,708 miles of NFTS motorized roads and trails, and 925 miles of motorized trails un-authorized for motorized use. Cross country travel is currently prohibited on 44,600 acres.

Direct impacts to sensitive/watchlist species from cross country use could be significant at least at the local, site specific level. The significance of direct and indirect impacts is dependent on many factors including the amount of disturbance, the sensitive/watchlist species being impacted, and in some cases, the season when the disturbance takes place. The significance of impacts is also dependent on the number of sensitive/watchlist species that occur in a specific location and how many of them are damaged. Occurrences of *Clarkia biloba* ssp. *Brandegeae*, *Fritillaria eastwoodiae*, *Lewisia kelloggii* ssp. *hutchisonii*, *Lupinus dalesiae*, and *Phacelia stebbinsii* are known to be impacted by use of NFTS motorized trails. Occurrences of *Lilium humboldtii* ssp. *humboldtii* are also known to be impacted by use of NFTS roads and trails.

Cross country impacts within forest edges and openings containing sensitive/watchlist species would be considered significant. It is impossible to know when or where cross country motorized vehicle use would occur, so these disturbances are difficult to quantify. Since Alternative 1 does not prohibit cross county travel, the risk of significant impacts to sensitive/watchlist species is higher than in the action alternatives. Reducing and/or eliminating impacts to sensitive/watchlist species through flag and avoid methods is not a practical mitigation when cross country travel is allowed. Not prohibiting cross country travel greatly increases the risk of negative impacts to sensitive/watchlist species.

Action Alternatives: All of the action alternatives prohibit cross country use on 498,700 acres of forested edges and openings. (All of the action alternatives prohibit use of some portion of the 925 miles of motorized trails un-authorized for motorized use located in these plant communities.) Therefore, direct/indirect impacts to sensitive/watchlist species within forest edges and openings from cross country travel would not occur. Refer to Table 3.06-13.

Table 3.06-13. Miles of Motorized Use within Forested Plant Communities* by Alternative

Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Existing NFTS roads and motorized trails	1,708	1,708	1,708	1,708	1,708	1,708	1,708
Private/other jurisdiction roads	289	289	289	289	289	289	289
Cross country travel (acres)	498,700	0	0	0	0	0	0
Motorized trails un-authorized for motorized use	925	0	0	0	0	0	0
Additions to the NFTS	0	43	0	16	191	45	26
Subtotal Motorized	**2922**	**2040**	**1997**	**2013**	**2188**	**2042**	**2023**

*Forested plant communities are those that are not considered older forest, oak woodland, aquatic/riparian, high elevation opening/rocky area, and serpentine. Miles represent motorized trails that pass within 100 feet of forested plant communities. Miles are approximate and NFS lands only.

2. Additions to the National Forest Transportation System (NFTS)

Indicator(s) used to measure effects:

- Miles of motorized trails to be added to the NFTS within forest edges and openings.
- Miles of motorized trails proposed to be added to the NFTS that have sensitive/watchlist species or weed occurrences within 100 feet.

No Action: Alternative 1 does not add motorized trails to the NFTS.

Action Alternatives: Table 3.06-13 shows the miles of motorized trails proposed to be added to the NFTS within these plant communities by alternative. Alternative 5 adds 191 miles of motorized trails to the NFTS or about 21 percent of the motorized trails un-authorized for motorized use in forest edges and openings. Alternatives 2 and 6 add 43 and 45 respectively or about 5 percent. Alternatives 4 and 7 add 16 and 26 miles respectively- about 2 and 3 percent of the motorized trails un-authorized for motorized use. Alternative 3 does not propose the addition of any motorized trails within forest edges and openings and would not directly or indirectly impact sensitive/watchlist species through motorized vehicle use of motorized trails un-authorized for motorized use.

Sensitive/watchlist plant occurrences found in the FY 2008 surveys will have direct motorized vehicle impacts reduced and/or eliminated through implementation of mitigations for them. Indirect impacts such as covering them in dust and increased risk of weed introduction and spread would still occur. However, if sensitive/watchlist species occur within 30 or 100 feet of the NFTS Maintenance Level 1 and temporary roads in Alternative 5 (refer to the alternative description section of this document for a listing) they will remain undetected and will continue to be directly and indirectly impacted. The significance of impacts to sensitive/watchlist species varies by such factors as the type of species, amount of disturbance, and location.

3. Cumulative effects including reasonably foreseeable

The spatial boundary of the cumulative effects analysis area is the TNF.

Indicator(s) used to measure effects: Past/present/reasonably foreseeable future actions that could potentially impact forest edges and openings and the sensitive/watchlist species that may occur within them, as well as the benefits from closing motorized trails un-authorized for motorized use are discussed. It is assumed that all of the action alternatives avoid long term cumulative impacts by implementing frequent evaluation of routes, implementing mitigations to reduce impacts to sensitive/watchlist species, and rapid detection/treatment of weeds. This motorized trail evaluation combined with rapid mitigation of resource damage avoids significant impacts to forest edges and openings and sensitive/watchlist species in the short and long term.

Past: Plants that are dependent on openings and edges within forested plant communities are not considered habitat specific and the habitats are not considered limited. Management activities have occurred on TNF system and privately owned lands for over a century. This long history of disturbance has contributed to the lack of an undisturbed reference for most species. Therefore, it is not possible to quantify how these past management activities have impacted sensitive plants/fungi and watchlist plants/plant communities. In addition, past management has created conditions on the landscape that frequently contribute to cross country travel through the creation of skid trails and temporary roads. For

example, temporary roads that were created during timber harvest projects are generally blocked off where they connect to system roads and trails once the project has been implemented. The temporary road may not be decommissioned because future silvicultural projects are planned. In a number of areas motorized vehicle users have removed the barriers blocking the temporary road and/or have gone around the barriers. Continued use of the temporary road creates a motorized trail that has not been designed for motorized use over the long term. Past management activities have cumulatively added to the amount of forest edge and opening habitats but it is unknown if the edge and opening habitats created were suitable for: *Androsace occidentalis* var. *simplex, Clarkia biloba* ssp. *Brandegeae*, *Erigeron petrophyllus* var. *sierrensis*, *Fritillaria eastwoodiae*, *Lewisia kelloggii* ssp. *hutchisonii*, *Lilium humboldtii* ssp. *humboldtii*, *Lupinus dalesiae*, and *Phacelia stebbinsii*.

Current: Openings and forest edges are constantly being created naturally as trees and other vegetation dies, and lost when shrubs and other vegetation grow into them. Forest edge and opening habitats along roads/trails/areas have frequently become invaded by weeds. Most of the known weed occurrences on the TNF are associated with roads, trails, and landings. Motorized vehicle use is known to increase the risk of weed introduction and spread into new areas, reduce native plant cover, increase erosion, reduce photosynthetic ability of native plants by covering vegetation with dust, change water flow patterns across the landscape, and compact soil. Refer to Appendices J (Sensitive Plant BE) and M (Weed Risk Assessment). Known impacts to specific sensitive/watchlist plants from current motorized vehicle use are discussed below.

The TNF has limited numbers of *Lewisia kelloggii* var. *hutchisonii* and limited amounts of suitable habitat. Several occurrences are currently being directly and indirectly impacted by cross country motorized vehicle use and use of system routes. The habitat where this plant grows frequently appears barren since this plant completes its life cycle in a period of weeks. Over the long term, continued and increased cross country motorized vehicle use within these occurrences will eventually kill plants through soil compaction, changes in hydrology, and/or direct impacts such as running over them. An example of where these negative impacts are occurring is within the occurrence located along and within road 302-15.

Most of the known occurrences of *Clarkia biloba* ssp. *Brandegeae* on the TNF are growing next to roads. Occurrences are currently being run-over by cross country motorized vehicles. In some areas, invasive exotic weeds have been introduced into these plant communities by motorized vehicles causing a degradation of the habitat for these sensitive plants. For example, the *Clarkia biloba* ssp. *Brandegeae* occurrence located near Mosquito Ridge road is infested with yellow star thistle due in part to people pulling off the road and introducing these weed seeds into new areas. Competition from the yellow star thistle for water and nutrients may eventually kill the *Clarkia biloba* ssp. *Brandegeae* occurrence. Current impacts include reduction of vigor and lack of reproduction of this annual plant, compaction and/or degradation of the soil within the occurrence, and/or changes to water movement where they are growing.

Lilium humboldtii ssp. *humboldtii* is currently being impacted primarily indirectly from use of lower elevation system routes. Impacts to known occurrences include introduction and spread of weeds. Since this is a spring flowering bulb species, impacts from dust are not considered significant.

Lupinus dalesiae occurrences are being directly and indirectly impacted by maintenance of system roads in several locations. *Phacelia stebbinsii* plants are being directly and indirectly impacted by motorized vehicle use on system and user created motorized trails in the Pierce OHV area. Use of system and motorized trails un-authorized for motorized use creates dust and increases the risk of weed introduction and spread.

Reasonably foreseeable: Forest edge and opening habitats are cumulatively impacted when past and current impacts are added to the reasonably foreseeable future actions identified in Table 3.00-1. The lower elevation forest edge and opening habitats located along system roads/trails/areas have frequently received weed seed from motorized vehicle use. All of the projects identified on Table 3.00-1 will disturb existing forest edge and openings and/or create new ones. All of the ground disturbing projects identified in Table 3.00-1 will or have already received botanical surveys to identify presence or absence of sensitive/watchlist species. Where sensitive/watchlist species are or where found, mitigations are implemented to reduce and/or eliminate impacts to them.

No action: Implementation of Alternative 1 allows cross country use on 498,700 acres containing 925 miles of motorized trails un-authorized for motorized use within NFS forest edge/opening habitats and carries the greatest risk of negative impacts to those habitats. Cross country use could directly and indirectly impact *Astragalus webberi, Calochortus clavatus var. avius, Clarkia biloba ssp. brandegeae, Fritillaria eastwoodiae, Lewisia kelloggii* ssp. *hutchisonii, Lewisia kelloggii* ssp. *kelloggii, Lupinus dalesiae, Penstemon personatus*, and *Phacelia stebbinsii* (if they occur within the area of cross county use). Predicting where cross country motorized vehicle use would occur is not possible. It is likely that this cross country travel would damage and/or kill sensitive/watchlist species. In addition, impacts to known occurrences would occur. Impacts could be significant dependent on such factors as the sensitive/watchlist species being impacted, the number of individuals being impacted, and the severity of the disturbance. For example, direct impacts to an annual plant (such as *Phacelia stebbinsii*) that has already gone to seed would not be as adverse (as long as significant habitat alteration has not occurred) as direct impacts to an annual plant that has not set seed. If motorized vehicle use impacted a sensitive/watchlist species to the point that it might not remain viable in an area and the loss of that species in that particular area would substantially increase risks to the entire species, the motorized vehicle use would have significant impacts to that species (Waples et al. 2007). As noted above, it is impossible to know when or where cross country motorized vehicle use would occur but since it would not be restricted in the no action alternative, the risk of negative impacts is higher. Since (in general terms) no prohibition of cross country travel would be in place to limit where motorized vehicle use could occur, all sensitive/watchlist species that can be accessed by motorized vehicles would be at increased risk. Cumulative impacts could be significant. Over the long term, cross country motorized vehicle use could kill significant numbers of sensitive/watchlist species and the occurrences could be lost. In addition, introduction of weeds could eventually eliminate the occurrences.

Implementation of Alternative 1 could impact *Astragalus webberi, Calochortus clavatus var. avius, Clarkia biloba ssp. brandegeae, Fritillaria eastwoodiae, Lewisia kelloggii* ssp. *hutchisonii, Lewisia kelloggii* ssp. *kelloggii, Lupinus dalesiae, Penstemon personatus*, and *Phacelia stebbinsii* and those impacts could contribute to a trend for federal listing as threatened or endangered. Implementation of

Alternative 1 could also impact the watchlist plants, *Erigeron petrophyllus* var. *sierrensis*, and *Lilium humboldtii* ssp. *humboldtii*. Impacts to watchlist plants are not considered significant unless entire occurrences are lost.

Action Alternatives: Surveys of about 62 miles of proposed motorized vehicle roads/trails/areas thus far have not identified any new occurrences of sensitive/watchlist species growing in forest edge and opening plant communities. If any sensitive/watchlist species occurrences are found in the FY 2008 surveys, direct impacts to them (from motorized vehicle use) will be reduced or eliminated. However, indirect impacts from dust and increased risk of weed introduction and spread could still occur. Refer to the discussion of impacts to forest edge and opening plant communities under the no action alternative. Since these types of plant communities have a high likelihood of having been disturbed in the more recent past, there is a high risk of weeds being present. Many of the proposed additions to the NFTS that pass through these plant communities pass through plantations of various ages. The list of proposed additions to the NFTS that pass through forest edges and openings is located within the project file since it is a long list (9 pages long). However, Table 3.06-13 displays the number of miles of motorized trails un-authorized for motorized use within forested plant communities by alternative.

Alternative 5: Of the action alternatives, implementation of Alternative 5 has the highest risk of indirect and cumulative impacts to forest edge/opening dependent sensitive/watchlist species since it has the greatest number of motorized roads/trails/areas open for use. However, implementation of Alternative 5 has less risk of indirect/cumulative impacts to sensitive/watchlist species dependent on forest edges/openings than Alternative 1 because it does not allow cross country travel. Impacts are not considered significant over the short term (5 years or less). Over the long term, the risk of weeds being introduced and spread along the 191 miles of proposed motorized trail additions to the NFTS and 1,708 miles of NFTS roads and trails is high. However, it is assumed that routine evaluation of motorized trails will occur by personnel who can identify weed species while the infestation is small in size and easily treated.

Alternatives 2 and 6: Implementation of Alternatives 2 and 6 could indirectly cumulatively impact sensitive/watchlist species dependent on forest edge and opening habitats but those impacts are not considered significant. Alternatives 2 and 6 prohibit use on about 95 percent of the motorized trails un-authorized for motorized use in forest edge and opening plant communities and do not allow cross country travel by motorized vehicles. If sensitive/watchlist species occurrences are found along motorized trails that have not been surveyed, mitigations will be developed to reduce and/or eliminate impacts to them.

Alternatives 4 and 7: Implementation of Alternatives 4 and 7 could indirectly and cumulatively impacts forest edge and opening plant communities but those cumulative impacts are not considered significant. Alternatives 4 and 7 have fewer miles of motorized vehicle roads/trails/areas open for use than Alternatives 1, 2, 5, and 6. Alternatives 4 and 7 add 16 and 26 miles of motorized trails un-authorized for motorized use or about 2 and 3 percent of the motorized trails un-authorized for motorized use to the National Forest Transportation System within forest edge and opening plant communities. Alternatives 4 and 7 also have a lower risk of introduction and spread of weeds than Alternatives 1, 2, 5, and 6.

Alternative 3: Implementation of Alternative 3 adds to the indirect and cumulative impacts of forest edge and opening plant communities and the sensitive/watchlist species dependent on them, but those impacts are not considered significant. Alternative 3 does not add any roads/trails/areas to the NFTS. Implementation of Alternative 3 does not allow cross country use. Implementation of Alternative 3 would prohibit use on all 925 miles of motorized trails un-authorized for motorized use but motorized vehicle use would continue on 1,708 miles of NFTS roads and motorized trails. This alternative has the lowest risk of weed introduction and spread which is a benefit for all sensitive/watchlist species.

Implementation of the action alternatives could impact *Astragalus webberi*, *Calochortus clavatus* var. *avius*, *Clarkia biloba* ssp. *brandegeae*, *Fritillaria eastwoodiae*, *Lewisia kelloggii* ssp. *hutchisonii*, *Lewisia kelloggii* ssp. *kelloggii*, *Lupinus dalesiae*, *Penstemon personatus*, and *Phacelia stebbinsii*, but would not contribute to a trend for federally listing them as threatened or endangered. Implementation of the action alternatives could also impact the watchlist plant, *Lilium humboldtii* ssp. *humboldtii*. Impacts to watchlist plants are not considered significant unless entire occurrences are lost.

High elevation openings and rocky areas

1. Prohibition of cross country travel

Indicator(s) used to measure effects:

- Acres of high elevation opening and rocky areas where cross country travel is prohibited

No Action: Implementation of Alternative 1 would directly, indirectly, and cumulatively impact the sensitive/watchlist species dependent on high elevation openings and rocky areas. Over the long term (5 years plus) those impacts could be significant. Alternative 1 does not prohibit cross country travel on 28,800 acres containing 36 miles. High elevation openings and rocky areas are generally considered accessible to motorized vehicles due to the lack of vegetation. Under implementation of Alternative 1 known and as yet undiscovered sensitive/watchlist species occurrences would be at risk of impacts from motorized vehicles. Long term cross country use could damage at least some sensitive/watchlist species occurrences and it is reasonable to expect that some occurrences would be lost.

There are about 43,240 acres of high elevation openings and rocky areas on TNF system lands, with about 79 miles of NFTS roads and motorized trails and 36 miles of motorized trails un-authorized for motorized use located within them. About 14,400 acres of high elevation openings and rocky area currently have a prohibition for cross country travel.

Direct impacts to sensitive/watchlist species from cross country use could be significant at least at the local, site specific level. The significance of direct and indirect impacts is dependent on many factors including the amount of disturbance, the sensitive/watchlist species being impacted, and in some cases, the season when the disturbance takes place. The significance of impacts is also dependent on the number of sensitive species that occur in a specific location and how many of them are damaged. Occurrences of *Erigeron miser* are known to be impacted by use of system routes.

Cross country impacts within high elevation openings and rocky areas containing sensitive/watchlist species would be considered significant. These areas are considered highly erosive with harsh growing conditions.

Action Alternatives: All of action alternatives prohibit cross country travel on 28,800 acres of high elevation opening and rocky area plant communities. All of the action alternatives prohibit use of some portion of the 36 miles of motorized trails un-authorized for motorized use. Therefore, direct/indirect impacts to sensitive/watchlist species within high elevation openings and rocky areas from cross country travel would not occur. Refer to Table 3.06-14.

Table 3.06-14. Miles of Motorized Use within High Elevation Opening and Rocky Areas by Alternative

Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Existing NFTS roads and motorized trails	79	79	79	79	79	79	79
Private/other jurisdiction roads	26	26	26	26	26	26	26
Cross country travel (acres)	28,800	0	0	0	0	0	0
Motorized trails un-authorized for motorized use	36	0	0	0	0	0	0
Additions to the NFTS	0	3	0	0	3	3	2
Total Motorized	**141**	**108**	**105**	**105**	**108**	**108**	**107**

2. Additions to the National Forest Transportation System (NFTS)

Indicator(s) used to measure effects:

- Miles of motorized trails proposed to be added to the NFTS system within high elevation openings and rocky areas.
- Sensitive/watchlist species occurrences (associated with high elevation openings and rocky areas) located within 100 feet of proposed additions to the NFTS. Surveys of about 62 miles of motorized trails un-authorized for motorized use have been completed to date. Erigeron miser was found within 100 feet of TKN-J5 and at the end of TKN-J4. The occurrence of Erigeron miser located at the end of TKN-J4 is a known occurrence. Erigeron miser was also found within 100 feet of the YRS-F1 near Fordyce Creek.)
- Weed occurrences located within 100 feet of proposed additions to the NFTS. No weeds were found at any of the Erigeron miser sites referred to above.

No Action: Alternative 1 does not add propose the addition of motorized trails to the NFTS.

Action Alternatives: Table 3.06-14 shows the miles of motorized trails added to the NFTS within these plant communities by alternative. Alternatives 2, 5 and 6 add 3 miles of motorized trails to the NFTS or about 8 percent of the motorized trails un-authorized for motorized use in high elevation openings and rocky areas. Alternative 7 adds 2 miles – about 6 percent. Alternatives 3 and 4 do not add miles in high elevation openings and rocky areas and would not directly or indirectly impact sensitive/watchlist species in those areas.

Erigeron miser occurrences located at the “cement slab” at the end of TKN-J5 and along Fordyce Creek (YRS-F1) are both currently being directly and indirectly impacted by use of motorized trails un-authorized for motorized use. Observations (by the author of this evaluation) have shown increased cross country motorized vehicle use within this plant community type on the TNF (compared to ten years ago). TKN-J5 is proposed for addition to the NFTS in Alternatives 2, 5, and 6. YRS-F1 is proposed for addition

to the NFTS in Alternatives 2, 5, 6, and 7. Mitigations to reduce impacts to these *Erigeron miser* occurrences are displayed in Appendix A (Road Cards) of the DEIS.

Sensitive/watchlist species occurrences found in the FY 2008 surveys will have direct motorized vehicle impacts reduced and/or eliminated through implementation of mitigations for them. Indirect impacts such as covering them in dust and increased risk of weed introduction and spread would still occur. However, if sensitive/watchlist species occur within 30 or 100 feet of the Maintenance Level 1 and temporary roads proposed to be added as motorized trails to the NFTS in Alternative 5 they will remain undetected and will continue to be directly and indirectly impacted. The significance of impacts to sensitive/watchlist species varies by such factors as type of species, amount of disturbance, and location.

3. Cumulative effects including reasonably foreseeable

The spatial boundary of the cumulative effects analysis area is the Tahoe National Forest.

Indicator(s) used to measure effects: Past/present/reasonably foreseeable future actions that could potentially impact high elevation openings and rocky areas and the sensitive/watchlist species that may occur within them, as well as the benefits from closing motorized trails un-authorized for motorized use are discussed. It is assumed that all of the action alternatives avoid long term cumulative impacts by frequently evaluating routes, implementing mitigations to reduce impacts to sensitive/watchlist species, and conducting early detection and treatment of weeds. Frequent motorized trail evaluation combined with rapid mitigation of resource damage avoids significant impacts to high elevation opening and rocky area plant communities and sensitive/watchlist species in the short and long term.

Past: These plant communities are located at 6,000 feet and above and are generally areas with shallow soil. They can be found within forested areas or on ridges above forested areas. Historic management activities have altered high elevation opening and rocky area habitats in a number of ways. These areas were grazed by livestock, timber was removed, roads and trails were built through them, and some of them were impacted by mining activities. Since the plant communities that occur at these sites have adapted to generally highly erosive and shallow soils, with harsh conditions and short growing seasons; those areas heavily disturbed may remain unvegetated. Heavy snow years and unchecked erosion can limit plant establishment and stop the vegetative recovery process or push it back by several decades (Willard et al. 2007). Some of these openings and rocky areas have become infested with weeds such as Klamath weed. Historic management activities have cumulatively reduced the amount and reduced the habitat quality for: *Arabis rigidissima* var. *demota, Claytonia megarhiza, Erigeron miser, Eriogonum umbellatum* var. *torreyanum, Lewisia longipetala, Tauschia howellii,* and *Tonestus eximius*. It is believed that the *Asplenium trichomanes-ramosum* occurrence located on the TNF is a disjunct occurrence and probably does not occur any where else on the TNF except in the limestone caves where it is currently known to occur. Historic management activities probably did not impact limestone caves on the TNF.

Current: Current management activities in high elevation openings and rocky areas are primarily recreation related. *Erigeron miser* occurrences occur along system and proposed motorized trails un-authorized for motorized use. *Erigeron miser* grows only on the TNF. It grows in the crevices between granite rocks - a habitat type that is limited in distribution on the TNF. Known occurrences are being

impacted by motorized vehicle use when users drive over granite slabs located within and adjacent to roads/trails/areas.

Other on going projects on the forest that impact high elevation openings and rocky areas include: motorized vehicle use of system routes; special uses projects such as utility corridor construction and maintenance that pass through and impact many different types of plant communities including high elevation openings and rocky areas; minerals operations that remove native vegetation and recontour the landscape; and livestock grazing projects. None of these ongoing projects impacts these plant communities significantly in the short term (5 years or less). However, they do increase the risk of weed introduction and spread especially over the long term.

Reasonably foreseeable: High elevation openings and rocky areas are cumulatively impacted when past and current impacts are added to the reasonably foreseeable future impacts. However, none of the actions identified in Table 3.00-1 are implemented in high elevation openings or rocky areas.

No action: Implementation of Alternative 1 adds to the cumulative impacts to sensitive/watchlist species dependent on high elevation openings and rocky areas through cross country travel on 28,800 acres containing 36 miles of motorized trails un-authorized for motorized use in these plant communities. Over the long term, continued and increased cross country motorized vehicle use within sensitive/watchlist species occurrences will eventually kill significant numbers of plants. Implementation of Alternative 1 may impact *Arabis rigidissima* var. *demota, Claytonia megarhiza, Erigeron miser, Eriogonum umbellatum* var. *torreyanum, Lewisia longipetala, Tauschia howellii*, and *Tonestus eximius* significantly over the long term (5 years plus) if motorized vehicle use eliminates entire occurrences through cross country travel. It is believed that the *Asplenium trichomanes-ramosum* occurrence located on the TNF is a disjunct occurrence and probably does not occur any where else on the TNF except in the limestone caves where it is currently known to occur. These limestone cave areas are inaccessible by motorized vehicles. Refer to the following discussion:

The terrain where *Eriogonum umbellatum* var. *torreyanum* grows is extremely difficult for motorized vehicles travels to travel on. Most of the known occurrences do not have motorized vehicle impacts and are not located in areas where it is believed motorized vehicle use will occur.

The known occurrences of *Lewisia longipetala* are near hiking trails not motorized vehicle trails. They are not located in areas where it is believed motorized vehicle use will occur due to the steepness and remoteness of the habitat.

There is only one occurrence of *Tauschia howellii* known to occur on the TNF. It is believed that motorized vehicle use will not occur in the steep, highly erosive habitat where this plant occurs. Current indirect impacts to this occurrence include dust, changed hydrology, and increased risk of weed introduction primarily from the staging/parking area that is located directly above this occurrence. These impacts are not considered significant at this time. If cross country motorized vehicle use increases over the long term (as projected), it is possible that this occurrence could be significantly impacted. The long term risk can not be quantified however. Implementation of Alternative 1 increases the risk of disturbance within these habitats.

The occurrences of *Claytonia megarhiza* on TNF system lands are north of Mount Lola and are believed to be inaccessible to motorized vehicles. *Tonestus eximius* has not been found on the TNF. Impacts to either species would be significant.

Therefore, implementation of Alternative 1 could impact Arabis rigidissima var. demota, Claytonia megarhiza, Erigeron miser, Eriogonum umbellatum var. torreyanum, Lewisia longipetala, Tauschia howellii, and Tonestus eximius and could contribute to a trend for federally listing them as threatened or endangered. Implementation of Alternative 1 would not impact Asplenium trichomanes-ramosum.

Action Alternatives: Implementation of the action alternatives could cumulatively impact sensitive/watchlist species dependent on high elevation openings and rocky areas. Those impacts are not considered significant. In the past, motorized vehicle use was not expected to occur in these habitats because they are generally steep and highly erosive, rock outcrops, and/or very high elevation rocky openings. However, current technology has increased the ability of motorized vehicles to travel in these kinds of habitats. When motorized vehicle use occurs near or within the habitat itself, damage to the habitat can be severe. The plants dependent on these habitats do not appear to compete well with other vegetation. Therefore, weed introduction and/or spread could kill them over the long term. These plant communities are already subject to natural erosion and have a short growing period. Any disturbance increases erosion and causes significant impacts to the soil and water components of the habitat. There are 15 motorized trails un-authorized for motorized use located in high elevation (6,000 feet plus) openings/rocky areas on NFS lands. These motorized trails include: H652-5-5, TKN-J4, TKN-J5, TKS-11, YRN-11, YRS-003b, YRS-F1, YRS-F1b, YRS-F1c, YRS-G3, and YRS-G3w. TKN-J4, TKN-J5, and YRS-F1 have occurrences of *Erigeron miser* within 100 feet of the route. Mitigations have been developed to reduce and/or eliminate impacts to these sensitive plant occurrences (refer to Appendix A – Road Cards). Mitigations would also be developed for sensitive/watchlist species occurrences found in the FY 2008 surveys.

Alternatives 2, 5, and 6: Cumulative impacts from implementation of Alternatives 2, 5, or 6 are not considered significant. All of these alternatives prohibit cross country travel. All of these alternatives propose the addition of about 3 miles of motorized trails un-authorized for motorized use to the NFTS. Conversely, Alternatives 2, 5, and 6 prohibit use on 33 miles of the 36 miles of the motorized trails un-authorized for motorized use in these plant communities or about 91 percent of them. There is less risk to sensitive/watchlist species dependent on high elevation opening/rocky area plant communities than in Alternative 1. However, of the action alternatives, implementation of Alternatives 2, 5, and 6 have the highest risk of negative indirect impacts to sensitive/watchlist species dependent on high elevation openings and rocky areas since they have the largest number of motorized roads/trails/areas open for use. Indirect impacts include impacts from dust and increased weed risk. Of the action alternatives, implementation of Alternatives 2, 5, and 6 have the highest risk of introducing and spreading weeds into high elevation openings and rocky areas. Of the action alternatives, implementation of Alternatives 2, 5, and 6 also add the greatest amount to the cumulative impacts to these species, but those impacts are not considered significant in the short and long term. Alternatives 2, 5, and 6 continue the indirect impacts to *Erigeron miser* occurrences located along TKN-J4, TKN-J5, and YRS-F1, through motorized vehicle use of those motorized trails.

Alternative 7: Cumulative impacts from implementation of Alternatives 7 are not considered significant. This alternative prohibits cross country travel, therefore there is less risk to sensitive/watchlist species dependent on high elevation opening/rocky area plant communities than in Alternative 1. This alternative proposes the addition of about 2 miles of motorized trails un-authorized for motorized use to the NFTS. Conversely, it prohibits use on 34 miles of the 36 miles of motorized trails un-authorized for motorized use in these plant communities or about 91 percent of them. There is less risk of indirect impacts to sensitive/watchlist species dependent on high elevation opening/rocky area plant communities than in Alternatives 2, 5, and 6 because there are fewer miles of motorized trail proposed and therefore less dust and weed risk. Alternative 7 continues the indirect impacts to *Erigeron miser* occurrences located along TKN-J4, TKN-J5, and the YRS-F1 near Fordyce Creek, through motorized vehicle use of those routes.

Alternatives 3 and 4: Implementation of Alternatives 3 or 4 adds to the cumulative impacts of high elevation openings and rocky areas the least. Alternatives 3 and 4 prohibit cross country use. Alternatives 3 and 4 do not propose the addition of any motorized trails un-authorized for motorized use to the NFTS. Alternatives 3 and 4 prohibit use on all 36 miles of motorized trails un-authorized for motorized use within these plant communities. Alternatives 3 and 4 do not indirectly impact *Erigeron miser* occurrences located along TKN-J4, TKN-J5, and the YRS-F1 near Fordyce Creek.

Therefore, implementation of the action alternatives could impact *Arabis rigidissima* var. *demota, Claytonia megarhiza, Erigeron miser, Eriogonum umbellatum* var. *torreyanum, Lewisia longipetala, Tauschia howellii*, and *Tonestus eximius*, but would not contribute to a trend for federally listing them as threatened or endangered. Implementation of the action alternatives would not impact *Asplenium trichomanes-ramosum*.

Noxious Weeds

1. Prohibition of cross country travel

Indicator(s) used to measure effects:

- Acres where cross country travel is prohibited.

No Action: Implementation of Alternative 1 would directly, indirectly, and cumulatively impact sensitive/watchlist species in the short and long term by increasing the risk of weed introduction and spread on TNF system lands. Implementation of Alternative 1 carries the highest risk of introduction and spread of aggressive, non-native plants (weeds) since it allows motorized vehicle use on the most miles of motorized trails un-authorized for motorized use by not prohibiting cross country travel on most of the forest (except closed areas such as areas on the American River Ranger District). Motorized vehicles could access more NFS lands and potentially spread weeds to all accessible sensitive/watchlist plant occurrences. Under implementation of Alternative 1, the number of motorized trails un-authorized for motorized use would increase through cross country use.

Those motorized trails un-authorized for motorized use that are known to have weed infestations have a high risk of weeds spreading along that route. Surveys to date have identified several motorized trails that are infested with weeds. Refer to Table 3.06-15. The motorized trails displayed in Table 3.06-15 have

the highest short and long term risk of weed spread. However, different weeds have different ecological impacts. Table 3.06-15 also provides an indication of the ecological impact of the type of weed that infests the route. Under implementation of Alternative 1, all of the motorized trails un-authorized for motorized use identified in Table 3.06-15 would continue to be used and that use would spread weeds. Possible effects are discussed by weed species below.

Cheatgrass: Cheatgrass exists and will continue to spread on both sides of the forest. It will remain patchy in occurrence on the westside of the forest and will not cover large areas unless all vegetation is removed from infested areas, such as in a large wildfire. On the eastside of the forest, vehicles will continue to spread seed of this non-native grass. Cheatgrass eventually takes over plant communities such as sagebrush/bitterbrush if those plant communities experience continued disturbance. This is especially true after wildfire events. Motorized vehicle use across the landscape increases the risk of cheatgrass seed dispersal. Cheatgrass infestation also increases the risk of wildfire ignition. Increased wildfires in sagebrush/bitterbrush plant communities could lead to habitat conversion. Sensitive/watchlist species located in areas where there is cheatgrass could be lost over the long term (5 years plus). Motorized trails un-authorized for motorized use known to have cheatgrass infestations within 100 feet of the motorized trails include: ARM-5, SV-P14, TKN-J9, TKN-M1 TKN-M2, YRS-SF6, YRM-M4 and YRN-509. Barriers will be placed between ARM-5 and the cheatgrass openings to reduce the spread of cheatgrass along that route. Boulders will be placed along TKN-J9 and the landing heavily infested with cheatgrass to keep motorized vehicles from spreading cheatgrass from the landing areas. The cheatgrass along TKN-M1 will be treated until the seed bank is exhausted. The cheatgrass in the turnaround area along YRS-SF6 and at the electronic site at the end of YRN-509 will be treated also. An *Ivesia sericoleuca* occurrence located along TKN-M2 has patches of cheatgrass within 100 feet of this sensitive plant. Therefore, the *Ivesia sericoleuca* along TKN-M2 has a high risk in the short and long term of being infested with cheatgrass. Individual plants of *Ivesia sericoleuca* could be lost in the short term. The entire occurrence could be lost over the long term if the cheatgrass infestation becomes large. Therefore, this occurrence will be monitored annually and any cheatgrass that is introduced into the occurrence will be hand pulled.

Musk thistle: Musk thistle will continue to spread along motorized trails and across landscapes located on the eastside of the forest. The areas most likely to experience musk thistle infestation include those where bare ground is formed, native vegetation is reduced, and a seed source is near. Motorized vehicles spread thistle seeds in the soil and mud attached to tires and vehicles. The bare soil areas created adjacent to motorized trails provide areas where thistle seeds can readily germinate and grow. Motorized trails un-authorized for motorized use known to have musk thistle infestations within 100 feet of the motorized trails include: SV-P14 and TKN-J13. There is an aspen clone located along SV-P14. Motorized vehicle use of these motorized trails would spread musk thistle into the aspen clone and to other areas. Over the long term motorized vehicle use could spread musk thistle to areas with sensitive/watchlist species. A manual treatment for the eradication of musk thistle on the eastside of the forest is ongoing.

Bull thistle: Bull thistle will continue to spread on both sides of the forest. The areas most likely to experience bull thistle infestation include those where bare ground is formed, native vegetation is reduced, and a seed source is near. Vehicles create bare soil and eliminate native vegetation within and adjacent to wheel tracks. Cross country use and use of motorized trails un-authorized for motorized use

will spread this weed to new areas. Over the long term, bull thistle may be spread to sensitive species occurrences. Bull thistle is known to occur along TKS-M9 and YRS-SF6. There are no known occurrences of sensitive/watchlist species along these routes. However, there is a long term risk of spreading bull thistle from TKS-M9 and YRS-SF6 to areas of sensitive/watchlist species.

Klamath weed: Klamath weed will continue to spread on both sides of the forest. Occurrences will remain patchy and will be located primarily along the sides of routes. Klamath weed seedlings are not strong competitors so reducing other vegetation benefits them. Therefore, it is expected that they will remain in disturbed areas. However, it is also expected that existing biological control agents will control this weed so it does not become widespread. Klamath weed is known to occur along YRN-M3b. There are no known sensitive/watchlist species occurrences along YRN-M3b. However, there is a long term risk of spreading Klamath weed from YRN-M3b to areas of sensitive/watchlist species.

Scotch and Spanish broom: Scotch and Spanish brooms will continue to spread on the westside of the forest. Occurrences will be located primarily along roads, trails and other disturbed areas. However, these brooms will invade adjacent forest also. Scotch and/or Spanish broom will continue to spread through vehicle use of the motorized trails un-authorized for motorized use where they occur: YRM-M3, YRM-M4, YRN-008, YRN-509, and within the Cal Ida network. There are no known sensitive and/or watchlist plants along theses motorized trails, but there is a long term risk of spreading these brooms to sensitive/watchlist plant occurrences. The brooms at these sites will be treated manually until the seed bank is exhausted.

Table 3.06-15. Known Weed Occurrences within 100 Feet of Motorized Trails Un-authorized for Motorized Use

Route ID	Weed occurrences known to occur within 100 feet of a motorized trail	Ecological impact rating (Cal IPC)
ARM-5	Large patches of cheatgrass are located adjacent to the trail	High
SV-P14	Musk thistle is within about 100 feet.	Moderate
TKN-J9	Wooly mullein and cheatgrass along route	Cheatgrass - High wooly mullein - Limited
TKN-J13	Musk thistle is adjacent to the trail.	Moderate
TKN-M1	Cheatgrass is located in and adjacent to the trail	High
TKN-M2	Patches of cheatgrass adjacent to the north end of the trail	High
TKS-M9	Small amounts of bull thistle and orchard grass adjacent.	Moderate
YRM-M3	Scotch broom is adjacent	High
YRM-M4	Scotch broom and cheatgrass	High
YRN-008	Scotch broom	High
YRN-509	Scotch and Spanish broom and cheatgrass	High
YRN-M3b	Klamath weed	Moderate
YRS-SF6	Bull thistle and cheatgrass	Moderate
35-4-P (Cal Ida)	Cheatgrass and tumble mustard are adjacent	High

Wooly mullein: Wooly mullein will continue to spread via seeds. Vehicles will spread seeds by moving them from place-to-place in soil or mud on tires. Vehicles will create bare soil areas that will help this weed become established. Continued disturbance will create new areas for it to move into. Wooly

mullein is known to occur within 100 feet of TKN-J9. There are no known sensitive/watchlist species occurrences along TKN-J9. However, there is a long term risk of spreading wooly mullein from TKN-J9 to areas of sensitive/watchlist species.

Action Alternatives: All of the action alternatives prohibit cross country travel which reduces the risk of introduction and spread of weeds by reducing the amount of NFS lands available for motorized travel. Therefore, the risk of direct/indirect impacts to sensitive/watchlist species from weed introduction and spread is less under the action alternatives in the short and long term compared to the no action alternative. Weeds will continue to spread on the forest, but it is believed the rate of spread will be slower than under the no action alternative primarily due to the prohibition of cross country travel.

2. Additions to the National Forest Transportation System (NFTS)

Indicator(s) used to measure effects:

- Miles of motorized trails un-authorized for motorized use proposed to be added to the NFTS system with weed occurrences with 100 feet of the motorized trail.
- Sensitive/watchlist species occurrences and/or watchlist plant communities located within 100 feet of proposed additions to the NFTS that have weed occurrences within 100 feet of the motorized trail.

No Action: Alternative 1 does not propose the addition of any motorized trails to the NFTS.

Action Alternatives: Surveys to date have located weed occurrences within 100 feet of: ARM-5, SV-P14, TKN-J9, TKN-J13, TKN-M1, TKN-M2, TKS-M9, YRM-M3, YRM-M4, YRN-008, YRN-509, YRN-M3b, YRS-SF6, and 35-4-P of the Cal Ida network. Those action alternatives that propose these motorized trails un-authorized for motorized use be added to the NFTS have a high risk of introducing weeds into sensitive/watchlist species occurrences and watchlist plant communities over the long term. TKN-M2 also has a sensitive species occurrence of *Ivesia sericoleuca* that has cheatgrass within 100 feet of it. Motorized vehicle use of TKN-M2 increases the risk of weed introduction and spread into this sensitive species occurrence in the short term (5 years or less). Aspen clones (watchlist plant communities) were found along TKN-M2, TKS-11, SV-005, SV-P8, and SV-P14. Motorized vehicle use of TKN-M2 and SV-P14 increases the risk of weeds being introduced and spreading within these aspen clones.

Alternatives 2, 5, and 6 propose the addition of all of the motorized trails un-authorized for motorized use known to have weed occurrences (except Alternative 2 does not propose 35-4-P). Alternatives 2, 5, and 6 propose the addition of TKN-M2 to the NFTS. Therefore, implementation of Alternatives 2, 5, and 6 have a high risk of introducing cheatgrass into the *Ivesia sericoleuca* occurrence and aspen clone located along TKN-M2 in the short and long term and cheatgrass and musk thistle into the aspen clone along SV-P14. Alternatives 2, 5, and 6 have a high risk of introducing weeds into sensitive/watchlist plant occurrences in other areas over the long term.

Alternative 7 proposes the addition of 9 of the 14 motorized trails known to have weed occurrences. Alternative 7 does not propose the addition of TKN-M2 to the NFTS. Implementation of Alternative 7 has a high risk of introducing weeds into sensitive/watchlist plant occurrences over the long term.

Alternative 4 proposes the addition of 7 of the 14 motorized trails known to have weed occurrences. Alternative 4 does not propose the addition of 4 of the 5 motorized trails known to impact aspen clones. Alternative 4 proposes SV-P14 and would continue to impact the aspen and spread weeds along that route. Implementation of Alternative 4 has a high risk of introducing weeds into sensitive/watchlist plant occurrences over the long term.

Alternative 3 does not propose the addition of any of the 14 motorized trails un-authorized for motorized use known to have weed occurrences. Implementation of Alternative 3 could still spread weeds to sensitive/watchlist species occurrences and watchlist plant communities over the long term. However, since Alternative 3 does not allow cross country travel and does not propose any additions to the NFTS, it is believed that the rate of weed spread would be slower. This is unproven.

3. Cumulative effects including reasonably foreseeable

The spatial boundary of the cumulative effects analysis area is the TNF.

Indicator(s) used to measure effects: Past/present/reasonably foreseeable future actions that could potentially impact TNF system lands and the sensitive/watchlist species that may occur within them, as well as the benefits from prohibiting cross country travel including motorized trails un-authorized for motorized use are discussed. It is assumed that all of the action alternatives avoid long term cumulative impacts by frequently evaluating routes, implementing mitigations to reduce impacts to sensitive/watchlist species, and conducting early detection and treatment of weeds. Frequent motorized trail evaluation to detect weeds combined with rapid treatment of those weeds avoids significant impacts to TNF system lands and sensitive/watchlist species in the short and long term.

Past: Most of the TNF is considered relatively weed free. This relatively weed free state may indicate that a source of weed seed was not available when TNF native plant communities were disturbed in the last century. This is unknown but appears to be a reasonable assumption based on literature that documents the progression of various weed species across California and the nation. It is also possible that weeds have persisted at low levels in some areas for decades before spreading rapidly when favorable conditions developed (Shepperd et al 2006). Many of the weeds found in California forests today were introduced intentionally or unintentionally by European settlers beginning in the 18th century (Bossard et al 2000). The lack of weed infestation in previously disturbed areas may also indicate less access onto the TNF by motorized vehicles. It is widely recognized that motorized vehicle use has increased over the last decade. It is also widely recognized that motorized use helps to spread weeds from place to place both by creating habitat along motorized trails and by carrying seed/weed plant parts on vehicles. However weeds were introduced, it is known that they are spreading across California. Jepson (1925) listed 292 non-native (weed) plant species in California. By the end of the 20th century the estimate for non-native plant species in California has risen to 1,045 (Randall and others 1998 in Shepperd et al 2006).

Current: In general terms, most weed occurrences on the TNF are located along State/County/Federal/NFS roads. Weed infestations degrade NFS lands (including habitats for sensitive/watchlist species) by directly competing with native plants and causing their displacement. The number and types of weed infestations known on the TNF are displayed in Appendix M in the Weed Risk Assessment for this project. Weeds are known to occur along NFTS roads and motorized trails as well as

motorized trails un-authorized for motorized use. Ongoing management actions such as utility corridors maintenance, mining operation, and livestock grazing continue to spread weeds from place to place across the forest. As noted in other sections of this document, there are weed infestations competing with sensitive species for soil, water and nutrients in several locations. Sensitive species occurrences with known weed infestations (and/or weed occurrences within 100 feet) include occurrences of *Clarkia biloba* ssp. *Brandegeae* (yellow star thistle), *Cypripedium fasciculatum* (Himalayan blackberry), *Erigeron miser* (Klamath weed) and *Ivesia sericoleuca* (cheatgrass). Weeds do not occur within all occurrences of these sensitive plants, but where they do the sensitive plant occurrence is at risk of being lost over the long term. Efforts have been made to reduce/eliminate the yellow star thistle in known *Clarkia biloba* ssp. *Brandegeae* occurrences along Mosquito Ridge road.

Motorized vehicle use of NFTS roads and motorized trails is also an ongoing activity that is known to negatively impact sensitive plants/fungi and/or watchlist plants and plant communities through the introduction of weeds. Motorized vehicle use of NFTS roads and motorized trails removes native vegetation, creating bare soil conditions. Dust from use of native surface motorized trails decreases native vegetation cover by reducing rates of photosynthesis, leaf conductance, transpiration, and water-use efficiency. Dust from motorized vehicle use has also been shown to increase temperatures of leaves and stems and decrease leaf surface areas (Munger et al 2003) negatively impacting plant vigor. Reduced native plant vigor increases the chance that weeds can become established.

Reasonably foreseeable: Implementation of those projects identified in Table 3.00-1 may introduce weed seed and/or weed plant parts into new areas. Equipment that operates off while doing contracted work for the TNF must wash that equipment if it is coming from a weed infested area. This requirement and requiring the use of certified weed free plant materials for erosion control (when needed) both reduce the risk of weed introduction from TNF management actions. However, all of the projects listed in Table 3.00-1 involve travel on system roads and could introduce weed seed into new areas from their vehicles. Ground disturbance favors weed spread if the weeds are already on or near the area being disturbed. It is reasonably foreseeable that weeds will continue to spread on the TNF and will be introduced into sensitive species occurrences over the long term.

No action: Implementation of Alternative 1 adds to the cumulative risk of weeds being introduced and spreading into sensitive/watchlist species occurrences. As identified in the weed risk assessment for this project (Appendix M) implementation of Alternative 1 has a high risk of introducing weeds into new areas and spreading weeds from areas that are already infested with weeds. Implementation of Alternative 1 does not prohibit cross country travel including motorized trails un-authorized for motorized use. Therefore, it has the greatest risk of negative impacts to TNF native plant communities and the sensitive/watchlist species dependent on them, of any of the alternatives. Implementation of Alternative 1 carries the highest risk of weed introduction into sensitive/watchlist species occurrences and watchlist plant communities since it allows motorized vehicle use on the greatest amount of NFS land.

Action Alternatives: Motorized vehicle use provides a continuous source of weed seed introduction and also provides disturbed areas within and adjacent to the motorized vehicle roads/trails/areas. Refer to the weed risk assessment located in Appendix M and the discussion under the no action alternative for more information. All of the action alternatives prohibit cross country travel. Therefore, all of the action

alternatives have less risk of introducing weeds into sensitive/watchlist species occurrences and/or watchlist plant communities than Alternative 1. In addition, the mitigations identified in Appendix A (Road Cards) will reduce the rate of spread of weeds along those motorized trails where the mitigations are implemented.

Alternative 5: Of the action alternatives, implementation of Alternative 5 has the greatest risk of weed introduction and spread and therefore the greatest risk of negative impacts to sensitive/watchlist species and/or watchlist plant communities since it proposes the addition of the most motorized trails un-authorized for motorized use to the NFTS. Alternative 5 adds about 283 of the 1,400 miles of motorized trails un-authorized for motorized use– or about 22 percent. Surveys of Alternative 5 proposed NFTS Maintenance Level 1 and temporary roads are not current, therefore these motorized roads may have weed occurrences that would go undetected and would spread and grow in size. It is unknown whether these NFTS Maintenance Level 1 and temporary roads have occurrences of sensitive/watchlist species, watchlist plant communities, or weeds. Implementation of Alternative 5 has a high risk of impacting sensitive/watchlist species and/or watchlist plant communities over the long term through the spread of weeds. Implementation of Alternative 5 prohibits cross country travel so it has less risk of spreading weeds into sensitive/watchlist species occurrences and/or watchlist plant communities over the long term than implementation of Alternative 1.

Alternatives 2 and 6: Alternatives 2 and 6 have a greater risk of spreading weeds into sensitive/watchlist species occurrences and/or watchlist plant communities over the long term than Alternatives 3, 4, and 7, but not as great a risk as Alternatives 1 and 5. Alternative 2 proposes the addition of 73 of the 1,400 miles of the motorized trails un-authorized for motorized use into the NFTS or about 6 percent. Alternative 6 proposes the addition of 70 miles or about 5 percent. In addition, Alternative 2 adds shoreline access on dry soils in the Prosser, Boca and Stampede reservoir areas. Reservoir shoreline areas are known to have weed occurrences when the water level is low. For example, Canada thistle is known to occur along the low water line of French Meadows reservoir and musk thistle and other weeds are known to occur along the Boca reservoir low water line. When these weed occurrences are covered with water, many of the weed seeds are killed. However, some of the weed seed floats to new areas. Any motorized vehicle use in the areas where the weeds are located will spread the weeds to new areas. Alternative 2 also proposes the addition of Eureka Diggings and Greenhorn areas. These are generally unvegetated areas where vehicles are not restricted to routes. These unvegetated areas provide sites where weeds can readily become established without competition from native vegetation. Established weed sites can spread weed seed to new areas as vehicles go from infested sites to other areas. Therefore, the risk of spreading weeds into sensitive/watchlist species occurrences and/or watchlist plant communities is higher in Alternative 2 than in Alternative 6, primarily because Alternative 2 has more designated open areas for motorized vehicle use.

Alternatives 4 and 7: Implementation of Alternatives 4 and 7 have a lower risk of spreading weeds into sensitive/watchlist species occurrences and/or watchlist plant communities than implementation of Alternatives 1, 2, 5, and 6. Alternative 4 proposes the addition of 31 miles of motorized trails un-authorized for motorized use to the NFTS or about 2 percent of the 1400 miles. Alternative 7 proposes the addition of about 45 miles or about 3 percent. The long term risk of negative impacts to

sensitive/watchlist species and/or watchlist plant communities from weed introduction and spread is lower because these alternatives propose the addition of fewer miles to the NFTS and prohibit cross country travel.

Alternative 3: Alternative 3 has the least long term risk of weed introduction and spread into sensitive/watchlist species occurrences and/or watchlist plant communities because it does not propose the addition of motorized trails un-authorized for motorized use to the NFTS, and prohibits cross country travel.

Plant Biodiversity and Plant Community Fragmentation

1. Prohibition of cross country travel

Indicator used to measure effects:

- Acres of inventoried roadless area with cross country travel prohibited.

No action: Alternative 1 does not prohibit use of the motorized trails un-authorized for motorized use located within inventoried roadless areas, and it allows cross country travel. Under implementation of Alternative 1, 54 miles of motorized trails un-authorized for motorized use located within inventoried roadless areas would be available for motorized vehicle use and accessible areas within those inventoried roadless areas would be available for cross country travel. As discussed above, this increases the risk of weed introduction and spread within these areas - increasing the risk to native plant biodiversity and fragmentation of the native plant communities. Impacts could be significant over the long term.

Inventoried roadless areas are considered some of the largest unroaded native plant communities on the TNF (except for Granite Chief Wilderness). Since inventoried roadless areas have not been surveyed, impacts to native plant biodiversity and fragmentation of native plant communities are assessed versus impacts to sensitive/watchlist species occurrences. Sensitive/watchlist species occurrences and watchlist plant communities add to native plant diversity and are considered important components of the native plant communities where they are located.

Action Alternatives: None of the action alternatives allow cross country travel within inventoried roadless areas. Therefore there is less long term risk to native plant diversity and less risk of fragmentation impacts to native plant communities located within inventoried roadless areas under implementation of the action alternatives (compared to the no action alternative). Of the action alternatives, Alternative 5 closes the fewest miles of motorized trails un-authorized for motorized use within these areas and has the highest long term risk to native plant diversity and greatest risk of fragmentation impacts to native plant communities located within inventoried roadless. Alternative 5 would prohibit use of 38 miles of motorized trails un-authorized for motorized use within these areas or about 70 percent of the 54 miles of motorized trails un-authorized for motorized use. Alternative 2 would prohibit use of about 45 miles of motorized trails un-authorized for motorized use or about 83 percent; Alternative 6 would prohibit use of about 46 miles or about 85 percent, Alternative 7 would prohibit use of about 47 miles or about 87 percent, and Alternatives 3 and 4 prohibits use of all 54 miles of motorized trails un-authorized for motorized use located within inventoried roadless areas. Alternatives 3 and 4 have

the lowest risk to native plant diversity and least risk of fragmentation impacts to native plant communities located within inventoried roadless areas.

2. Additions to the National Forest Transportation System (NFTS)

Indicator used to measure effects:

- Miles of motorized trails un-authorized for motorized use proposed for addition to the NFTS that are located within inventoried roadless areas. (The TNF currently has 109,100 acres of inventoried roadless area with 54 miles of motorized trails un-authorized for motorized use.)

No action: Alternative 1 does not propose the addition of any motorized trails un-authorized for motorized use to the NFTS, but also does not prohibit cross country travel on 109,100 acres including 54 miles of motorized trails un-authorized for motorized use located within inventoried roadless areas. Alternative one has the highest long term risk to native plant diversity and greatest risk of fragmentation impacts to native plant communities located within inventoried roadless of all the alternatives.

Action Alternatives: All of the action alternatives would reduce miles and acres open for motorized vehicles in inventoried roadless areas by prohibiting cross country travel. Of the action alternatives, Alternative 5 proposes the addition to the NFTS of the greatest number of motorized trails un-authorized for motorized use located in inventoried roadless areas – about 16 miles. Sixteen miles of motorized trail is about 30 percent of the existing miles of motorized trails un-authorized for motorized use within these areas. Of the action alternatives, Alternative 5 has the highest long term risk to native plant diversity and greatest risk of fragmentation impacts to native plant communities located within inventoried roadless areas. Refer to Table 3.06-16 which displays the number of miles of motorized trails un-authorized for motorized use proposed for addition to the NFTS in inventoried roadless areas. Alternative 2 adds 9 miles, Alternative 6 adds 8 miles, and Alternative 7 adds seven miles of motorized trails un-authorized for motorized use to the NFTS. These additions range from 13 to 17 percent of the miles of the motorized trails un-authorized for motorized use within these areas. Alternatives 3 and 4 do not add any motorized trails un-authorized for motorized use within inventoried roadless areas to the NFTS. Alternatives 3 and 4 have the lowest risk to native plant diversity and least risk of fragmentation impacts to native plant communities located within inventoried roadless areas.

Large blocks of land such as inventoried roadless areas are especially important areas for maintaining native plant and plant community diversity (Loomis et al. 2000). Inventoried roadless areas provide a natural benchmark or control to judge the effects of human development on natural systems and to understand relatively undisturbed ecological processes. In addition, naturally functioning ecosystems (plant communities) such as those often found in inventoried roadless areas provide many valuable services including watershed protection, carbon storage, nutrient cycling, pest control, pollination, and fish and wildlife habitat (ibid).

Table 3.06-16. Total Miles of Motorized Use in Inventoried Roadless Areas by alternative

Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Existing NFTS roads and motorized trails	129	129	129	129	129	129	129
Private/other jurisdiction roads	23	23	23	23	23	23	23
Cross country travel (acres)	109,100	0	0	0	0	0	0
Motorized trails un-authorized for motorized use (miles)	54	0	0	0	0	0	0
Additions to the NFTS	0	9	0	0	16	8	7
Subtotal Motorized	**206**	**161**	**152**	**152**	**168**	**160**	**159**

Sensitive/watchlist species located along motorized trails are more likely to be exposed to disruption by human activities and to experience problems with weeds. Adding motorized trails un-authorized for motor vehicles use to the NFTS within inventoried roadless areas increases the risk that sensitive/watchlist species and/or watchlist plant communities will be lost and/or have the plant community where they are located fragmented by the motorized vehicle use and weeds. Once these motorized trail additions are shown on maps, they could receive increased use. In addition, as demand increases, these motorized trails are expected to see increased use. Additional use could increase the risk of weed seed being introduced into the inventoried roadless area. Early detection of new weed introductions would be difficult since these areas are remote and generally accessible only by specialized 4 wheel drive/ motorcycle equipment. TNF personnel trained in weed identification rarely travel them. Weeds could be introduced and go undetected for long periods of time. Infestations of weeds into these relatively weed free areas could negatively impact sensitive/watchlist species occurrences. Over the long term, sensitive/watchlist species occurrences and/or watchlist plant communities could be displaced and/or severely impacted by weeds.

3. Cumulative effects including reasonably foreseeable

The spatial boundary of the cumulative effects analysis area is the Tahoe National Forest.

Indicator(s) used to measure effects: Past/present/reasonably foreseeable future actions that could potentially impact inventoried roadless areas and the sensitive/watchlist species and/or watchlist plant communities that may occur within them, as well as the benefits from prohibiting cross country travel are discussed. It is assumed that all of the action alternatives avoid long term cumulative impacts by frequently evaluating routes, implementing mitigations to reduce impacts to sensitive/watchlist species and/or watchlist plant communities, and conducting early detection and treatment of weeds. Frequent motorized trail evaluation to detect weeds combined with rapid treatment of those weeds avoids significant impacts to TNF system lands and sensitive species in the short and long term.

Past: Past actions that have impacted the inventoried roadless areas on the TNF include all of the past actions identified under the different plant communities in this report. Inventoried roadless areas were not identified until the late 1970's during the Roadless Area Review and Evaluation (RARE I and RARE II). The character and amount of roads, private land, and motorized trails varies greatly by roadless area. Refer to section 3.09 for more information.

Current: Current management activities that occur within TNF inventoried roadless areas include use of NFTS roads and motorized trails, activities on private land that are adjacent to NFS lands, livestock

grazing and minerals operations. The amount of use of NFTS roads and motorized trails, the types of private land activities, the amount and location of livestock grazing, and the minerals operations also vary by inventoried roadless area. For example, the motorized trails un-authorized for motorized trails are proposed in the West Yuba inventoried roadless area: YRN-M3b, YRN-M3a, YRN-7, and YRN-M2. All of these motorized trails except YRN-7 were pioneered by miners to access mining claims. The East Yuba roadless area also has active mining operations. YRN-001, YRN-M1, YRN-11, YRN 5a and 5c, YRN-9, YRN-007, and YRN-4 are all motorized trails un-authorized for motorized use within the East Yuba roadless area. Of these routes, YRN-M1, YRN-007, and YRN-4 were pioneered by miners. YRN-11, YRN 5a and 5c, YRN-9 and probably YRN-001 were pioneered by users. Motorized trails un-authorized for motorized use that are used by miners to access their mining claims will remain available for their use regardless of the alternative selected. Refer to section 3.09 for more information about each roadless area.

Reasonably foreseeable: Implementation of those projects identified in Table 3.00-1 would not impact inventoried roadless areas. None of those projects are located within inventoried roadless areas.

No action: Implementing Alternative 1 has a greater risk of negative impacts to native plant diversity and a greater risk of negative impacts to native plant communities (and therefore the sensitive/watchlist species dependent on them) located within inventoried roadless areas than the action alternatives. Alternative 1 has a higher risk of these negative impacts to plant diversity and connectivity primarily due to allowing cross country travel on 109,100 acres including all 54 miles of motorized trails un-authorized for motorized use within roadless areas.

Motorized vehicle disturbance within inventoried roadless areas can reduce native plant biodiversity. Loss of native plant biodiversity is dependent on the intensity of motorized vehicle use, but even a single vehicle pass can destroy or disrupt many types of plant communities. Plants with shallow root systems may be especially vulnerable (Wilshire 1983, Lacey et al. 1997). This loss of native vegetation increases the risk of soil loss due to wind and water erosion. Soil loss increases the decomposition of organic matter, weakens soil aggregate stability and can result in the formation of inorganic surface crusts. Inorganic surface crusts increase water runoff, inhibit germination and emergence of seedlings, and reduce water penetration into the soil. Natural soil stabilizers such as organic (lichen, fungal and algal) soil crusts are highly vulnerable to cross country motorized vehicle use. All of these impacts contribute to native plant community degradation and fragmentation.

Motorized vehicle use can fragment native plant communities. Plant community fragmentation is an issue for at least some sensitive/watchlist species. Those sensitive/watchlist plants with specific pollination and habitat requirements are the most vulnerable to habitat fragmentation impacts. For example, *Cypripedium fasciculatum* requires mycorrhizal connections under ground and specific pollinators and is associated with older forests. Motorized roads and trails are frequently identified as the cause of habitat fragmentation. Cross country motorized vehicle use has been shown to have the same fragmentation effects as motorized vehicle routes. Cross country motorized vehicle use has been shown to reduce perennial and annual plant cover, reduce plant density, and overall above-ground vegetative biomass (Hall 1989). In general terms, the degree of plant loss depends on the intensity of motorized vehicle use.

The density of NFTS roads and motorized trails in the various roadless areas is described in section 3.09 (Inventoried Roadless Areas and Special Areas). Under Alternative 1, cross country use in roadless areas could create higher road and trail density over the long term with negative cumulative impacts to native plant communities. Several areas on the TNF have a high density of motorized vehicle roads/trails/areas – however none of the watersheds within inventoried roadless areas are considered high risk watersheds. Refer to section 3.02 (Soil and Watershed Resources).

The inventoried roadless areas on the TNF are considered relatively free of motorized roads and trails and are assumed to provide quality habitat for native plants/fungi. Since complete botanical surveys of inventoried roadless areas and other areas of the forest are not available, these assumptions are unproven. However, it is reasonable to expect relatively undisturbed large geographic areas to provide quality habitat for native plants/fungi.

Large blocks of unfragmented land (such as roadless areas) play an important role in providing habitat for threatened, endangered, proposed (TEP), and sensitive plant species (USDA FS 2000). Nationally, roadless areas provide large, relatively undisturbed blocks of important habitat including more than 1,400 sensitive and almost 100 TEP plant species (ibid). The inventoried roadless areas on the TNF have not been completely surveyed. It is expected that inventoried roadless areas on the TNF provide important biological strongholds for native plant species and communities just as they do across the nation. Sensitive, watchlist, and other native plants in TNF inventoried roadless areas are less likely to be exposed to disruption by human activities such as collection, trampling, and other disturbance. This lower level of disruption may make roadless areas important references for understanding the natural composition and dynamics of native plant communities.

TNF inventoried roadless areas are less likely to experience problems with nonnative invasive species (weeds) and are more likely to be able to maintain intact native plant communities. Roadless areas provide or affect habitat for almost 60 percent of the TEP species found on or affected by NFS lands (USDA FS 2000). This is over 10 percent of all plant species listed under the Endangered Species Act within the United States, and almost 70 percent of Forest Service designated sensitive species (ibid). TEPS species benefit within inventoried roadless areas by having reduced risk of future habitat degradation and disturbance, and conservation of existing biological strongholds. Implementation of the no action alternative would not provide these benefits to sensitive species.

TEPS species are at increased risk of adverse cumulative effects from increased population growth and associated land uses, land conversions, and nonnative species (weed) invasions. Therefore, the value of relatively unfragmented blocks of land such as inventoried roadless areas to TEPS species is likely to increase as habitat loss and habitat degradation increase in scope and magnitude. Implementation of the no action alternative increases habitat loss and habitat degradation. Habitat loss and degradation, and adverse effects to TEPS and other native plant species viability from the invasion and/or encroachment of non-native plant and animal species are increasing.

Action Alternatives: All of the action alternatives reduce impacts to native plants and plant communities by prohibiting cross country travel and reducing the amount of motorized roads and trails within inventoried roadless areas. The action alternatives that propose the addition of the most miles of motorized trails un-authorized for motorized use to the NFTS within inventoried roadless areas have the

greatest risk of negatively impacting native plant biodiversity and fragmenting native plant communities (and the sensitive species within them). The risk to native plants is closely tied to the high risk of introducing weeds into large blocks of land that are currently considered weed free.

Alternative 5: Of the action alternatives, implementation of Alternative 5 has the greatest risk of negative impacts to native plant diversity and has a greater risk of negative impacts to native plant communities through fragmentation. Of the action alternatives, Alternative 5 proposes the addition of the greatest number of motorized trails un-authorized for motorized located in inventoried roadless areas to the NFTS – about 16 miles. Sixteen miles of motorized trail is about 30 percent of the existing miles of motorized trails un-authorized for motorized use within these areas. Of the action alternatives, implementation of Alternative 5 has more miles of proposed motorized trail additions to the NFTS and more risk of weed introduction and spread within large geographic areas. The significance of these impacts is hard to quantify. However, the risk is believed to be a long term risk (over five years) since motorized vehicle use of motorized trails un-authorized for motorized use is currently considered low.

Alternatives 2, 6 and 7: Implementation of Alternatives 2, 6 and 7 have more risk of negative impacts to native plant diversity and native plant community fragmentation caused by weed introduction and spread than Alternatives 3 and 4, but not as much as Alternatives 1 and 5. Alternative 2 adds 9 miles, Alternative 6 adds 8 miles, and Alternative 7 adds seven miles of motorized trails un-authorized for motorized use to the NFTS. These additions range from 13 to 17 percent of the miles of the motorized trails un-authorized for motorized use within these areas. Conversely, Alternative 2 would prohibit use on about 45 miles of motorized trails un-authorized for motorized use or about 83 percent; Alternative 6 would prohibit use on 46 miles or about 85 percent, Alternative 7 would prohibit use on about 47 miles or about 87 percent.

Alternatives 3 and 4: Implementation of Alternatives 3 and 4 have the least risk of negative impacts to native plant biodiversity and fragmentation of native plant communities within roadless areas through introduction and spread of weeds. Alternative 3 and 4 do not propose additions to the NFTS within inventoried roadless areas. Alternatives 3 and 4 prohibit use on all motorized trails un-authorized for motorized use located within roadless areas. Implementation of Alternatives 3 and 4 will benefit sensitive/watchlist species (if they occur there)/native plant diversity/native plant community connectivity by reducing the risk of weed introduction and spread by motorized vehicles.

The value of large blocks of land such as inventoried roadless areas in conserving sensitive/watchlist species and/or watchlist plant communities is likely to increase as native plant communities are lost and/or degraded throughout the Sierra Nevada region through development, climatic change, weed and non-native animal infestation, etc.

3.07. Recreation and Scenic Values

Regulatory Framework

National Forest Management Act (NFMA): The National Forest Management Act (NFMA), and its implementing regulations, required the inventory and evaluation of the forest's recreation and scenic resources. Management Area direction is included for Visual Quality Objects and Recreation Opportunity Spectrum. This and other Forest Plan direction is summarized is *Chapter 3.00 Introduction*.

Travel Management Rule: In the designation trails or areas, the responsible official shall consider effects on forest resources.

Affected Environment

Introduction

This section of the Motorized Travel Management environmental analysis examines the extent to which alternatives respond to recreation resource management direction established in the Tahoe National Forest Land and Resource Management Plan. The Forest Plan recreation direction was established under the implementing regulations of the National Forest Management Act (NFMA). The NFMA requires the provision of a broad spectrum of forest and rangeland-related outdoor recreation opportunities that respond to current and anticipated user demands. Specifically for "off-road vehicle" use, the NFMA requires that these opportunities be planned and implemented to protect land and other resources, promote public safety, and minimize conflicts with other uses of the National Forest System lands.

Overview

The Tahoe National Forest (TNF) is strategically located between the greater metropolitan areas of Sacramento and Reno linked by Interstate 80. The Forest is less than an hour drive from both cities and the San Francisco Bay Area is about a three hour drive. The Forest offers high mountain scenery, attractive reservoirs and lakes, beautiful river canyons, and a wide range of campgrounds and trails for forest visitors. The combination of proximity to urban areas and attractive recreation opportunities results in high visitation levels. Over the years the TNF has ranked nationally in the top twenty of total Forest visitors. Based on the National Visitor Use Monitoring Results for the TNF, the Forest received an estimated three million six hundred ninety thousand visits in 2001. A visit is defined as the entry of one person upon a national forest to participate in recreation activities for an unspecified period of time. A visit could be one hour or several days. Based on this survey, broadly speaking, approximately one third of visitors are primarily focused on winter sports, one third motorized vehicle activities and one third non-motorized activities. This chapter will focus on the "summer" visitors. It is acknowledged that forest visitors take part in many recreational activities so there is a great amount of overlap of activities. For example, some people will use a four wheel drive vehicle to access dispersed camping sites and to go fishing while others may travel to a developed campground with a passenger vehicle to hike or explore the forest on a motorcycle or mountain bike. With this in mind the statistics associated with Forest visits and recreation activities should be seen as sampling trends and not precise figures. To discuss these recreation opportunities we will look at both Motorized and Non-motorized recreation opportunities. The

other issue to keep in mind is the high amount of private land within the TNF boundary much of it in a checkerboard pattern of square miles alternating from private land to National Forest system land.

From a recreation management point of view, as stated in the Forest Land Management Plan a key goal of recreation is to provide for a wide range of recreation opportunities. For OHV recreation opportunities this means the Forest should be providing OHV recreation opportunities in a variety of settings from semi-primitive motorized areas to fairly developed roaded natural areas. OHV trails should also offer a range of trail experiences in terms of length, range of difficulty from easy to difficult, and a range of recreation opportunities including access to dispersed camping, access to fishing, hunting, viewing wildlife, access to scenic vistas, and other opportunities to explore the back country of the Forest. There is also a desire to provide OHV trails that are designed for user enjoyment in terms of vegetation type, layout of the trails with pleasing alignments, loop opportunities, or trail systems that connect so users can explore a variety of trails, and opportunities for solitude and remoteness. An additional component to consider is the convenience and access to both formal developed trail heads and informal staging from paved roads and their relationship to desired trail systems.

The following narrative represents the activities occurring on National Forest system lands, not on private land.

Motorized Recreation Opportunities

California is experiencing the highest level of OHV use of any state in the nation. There were 786,914 ATVs and OHV motorcycles registered in 2004, up 330% since 1980. Annual sales of ATVs and OHV motorcycles in California were the highest in the U.S. for the last 5 years. Four-wheel drive vehicle sales were extremely high. They increased 1500% to 3,046,866 from 1989 to 2002. The Tahoe National Forest has seen an increase in demand over time. The Forest has worked with the California Parks and Recreation Department, Off-Highway Motor Vehicle Recreation Division and used grants from the Division in tandem with USFS dollars to provide OHV trailheads, OHV campground facilities, build OHV trails, maintain OHV trails, restore areas damaged by OHV use, and enforce OHV rules on National Forest System lands.

Motorized recreation opportunities encompass a wide range of activities and for convenience can be separated by Off Highway Vehicle use and all other Motorized Vehicle use. Table 3.07-1 displays the amount and type of current motorized opportunities on the Forest.

Table 3.07-1. Amount and Type of Current Motorized Opportunities

Road and Trail Category	Season of Use	Miles
Roads open to highway legal vehicles only	May 1 to Dec. 31	23.6
Roads open to highway legal vehicles only	May 1 to Nov.1	7.5
Roads open to highway legal vehicles only	Open All Year	601.7
Roads open to all vehicles	May 1 to Dec. 31	6.6
Roads open to all vehicles	May 1 to Nov. 1	98.0
Roads open to all vehicles	Jan. 1 to Sept. 15	5.5
Roads open to all vehicles	Open All Year	1,786.1
Trails open to high clearance vehicles	May 1 to Nov. 1	5.3
Trails open to high clearance vehicles	Open All Year	184.5

Road and Trail Category	Season of Use	Miles
Trails open to ATVs and motorcycles (<48")	Open All Year	17.5
Trails open to motorcycles	May 1 to Nov. 1	0.8
Trails open to motorcycles	Open All Year	126.6
Other jurisdiction roads (i.e. County and State)	Open All Year	928.8
Other non-system roads (Private)	Open All Year	1,584.9
Roads and trails un-authorized for motor vehicles remaining	Not Applicable	1388.9
	Total	**6,768**

Authorized Off Highway Vehicle Recreation Opportunities

For purposes of this report, Off Highway Vehicle (OHV) use is considered to be the use of four wheel drive (4WD) vehicles, all terrain vehicles (ATVs), and motorcycles, on rough roads and trails that require some skill and challenge to operate. Four wheel drive vehicles operating on paved or smoothly graded roads will be considered part of general motorized use. Based on the National Visitor Use Monitoring report, about 4 percent of users or about 147,600 visits can be attributed to OHV use as their primary activity while around 10 percent or 369,000 visits can be attributed to OHV use where OHV use is one of several activities reported by the user. Table 3.07-2 displays the amount of National Forest System roads and trails currently authorized for use by Off Highway Vehicles.

Table 3.07-2. Amount of Roads and Trails Currently Authorized for Use by Off Highway Vehicles

Description	Season of Use	Miles
Roads open to all vehicles	May 1 to Dec. 31	6.6
Roads open to all vehicles	May 1 to Nov. 1	98.0
Roads open to all vehicles	Jan. 1 to Sept. 15	5.5
Roads open to all vehicles	Open All Year	1,786.1
Subtotal Roads Open to All Vehicles		**1,896.2**
Trails open to high clearance vehicles	May 1 to Nov. 1	5.3
Trails open to high clearance vehicles	Open All Year	184.5
Subtotal Trails Open to High Clearance Vehicles		**189.8**
Trails open to ATVs and motorcycles (<48")	Open All Year	17.5
Subtotal Trails Open to ATVs and Motorcycles		**17.5**
Trails open to motorcycles	May 1 to Nov. 1	0.8
Trails open to motorcycles	Open All Year	126.6
Subtotal Trails Open to Motorcycles		**127.4**
Total All Miles		**2,230.9**

The Forest has almost 1,900 miles of rough surface roads which are currently authorized for use by all vehicles including passenger cars as wells as four wheel drive (4WD) vehicles, all terrain vehicles (ATVs), and motorcycles. In addition the Forest provides approximately 334 miles of general purpose trails that allow hiking, mountain biking, and motorized use together. Of those, approximately 190 miles are primarily used by 4WD, 18 miles are primarily used by ATVs and 127 miles are primarily used by motorcycles.

The Forest does not collect specific use figures for each trail or area but we can characterize use in certain areas of the Forest including Sugar Pine Reservoir, Burlington Ridge, Downie River Lavezzola Area, Gold Valley, Truckee, Greenhorn Creek and Fordyce Creek.

Sugar Pine Reservoir: The motorcycle trail system near Sugar Pine Reservoir is the closest OHV opportunity for residents in the Sacramento Metropolitan Area on the Tahoe National Forest. As such it supports the highest use of motorcycles on the forest. Most of these trails are considered easy or moderate with just a few miles of more difficult trail which provides a family oriented experience. The Forest has only a limited number of trails designed for ATV use and these are also located in the Sugar Pine area.

Burlington Ridge: The motorcycle trail system centered on Burlington Ridge receives a moderate amount of use on easy and moderate difficulty trails. The area provides a unique woods riding opportunity with very tight turns winding through the trees. Some sections require stopping to work the motorcycle through the tight turns. Past use of this area was predominately by local residents of Grass Valley and Nevada City. Recently, however, the area the area has been discovered by people from outside the local area and has received an increase in use.

Downie River Lavezzola Area: On the far northern part of the Yuba River District very difficult motorcycle trails (Double Black Diamond) provide challenging remote opportunities in a relatively pristine environment. These trails receive much lighter use than others on the Forest. These trails provide one of the few high Sierra opportunities for semi-primitive, highly challenging motorcycle trails and are considered a very valuable resource for motorcycle riders. Trails in this area are very rocky, narrow and steep. Only the most experienced of riders have the skills to negotiate these trails.

Gold Valley: The Gold Valley Area provides some moderate difficulty four wheel drive and motorcycle opportunities in a remote setting. There are several dispersed sites located adjacent Pauley Creek which provide excellent camping opportunities.

Truckee: The terrain on the east of the Forest is relatively flat with open vegetation. The Truckee Area provides some motorcycle trails near Boca, Prosser, and Stampede Reservoirs. Boca, Prosser and Stampede Reservoirs themselves are also currently used by motorized vehicles below the high water to access the shoreline for camping, boating, and other day use activities. The area also provides several 4WD trails with at least moderate challenges.

Greenhorn Area: Located just outside of Nevada City, the Greenhorn is popular four wheel drive and motorcycle use area by local residents. The majority of the area was hydraulically mined during the gold rush resulting in a lack of vegetation. The area also has a currently operating gravel plant. There are several residences immediately adjacent to the Greenhorn Area who are concerned about the amount and type of OHV use in the area. Law enforcement in response to illegal activities occurring in the area has been a continuing problem.

Fordyce Area: The Fordyce Area is one of the most popular and well known four wheel drive destinations in the Sierra Nevada. The very popular and renowned Fordyce Jeep trail accommodates over 2000 jeeps during the Sierra Trek event, on a very difficult and challenging trail.

Other Authorized Motorized Vehicle Recreation Opportunities

The existing Forest Service road system provides motorized access and recreation driving opportunities to most areas of the Forest. Motorized recreation activities include driving for pleasure and providing access to hiking and walking, fishing, bicycling, viewing natural features, hunting, boating, developed and primitive camping, picnicking, viewing wildlife, backpacking, resort use, visiting historic sites, nature

study, gathering forest products, horseback riding, and nature center activities. Many 4WD vehicles that are capable of OHV use never get off of Forest system roads and the driver uses them as passenger vehicles or high clearance vehicles but never actually needs to put the vehicle into 4WD mode. On the other hand, off highway vehicles are also used to access many of the above activities in remote areas on rough roads that could not be accessed by regular passenger vehicles. Based on the National Visitor Use Monitoring Results for the Tahoe National Forest one can infer that about two thirds (2,460,000 visits) of Forest Visits are at least partly tied to general summer motorized recreation to the extent that they use motor vehicles to access all the recreation opportunities described above including non-motorized activities. The survey also shows that 5.3% of visitors or approximately 195,570 visitors indicated that driving for pleasure was their primary activity. The amount of National Forest Transportation System roads open to these types of activities and season of use are shown in Table 3.07-3.

Table 3.07-3. National Forest Transportation System Roads currently authorized for motor vehicle use

Description	Season of Use	Miles
Roads open to highway legal vehicles only	May 1 to Dec. 31	23.6
Roads open to highway legal vehicles only	May 1 to Nov. 1	7.5
Roads open to highway legal vehicles only	Open All Year	601.7
Subtotal Roads Open to Highway Legal Vehicles Only		**632.8**
Roads open to all vehicles	May 1 to Dec. 31	6.6
Roads open to all vehicles	May 1 to Nov. 1	98.0
Roads open to all vehicles	Jan. 1 to Sept. 15	5.5
Roads open to all vehicles	Open All Year	1,786.1
Subtotal Roads Open to All Vehicles		**1,896.2**
Grand Total All Roads		**2,529.0**

There is a total of approximately 630 miles of roads currently authorized as open for motor vehicle use by highway legal vehicles only. The public use of these roads is restricted to licensed insured drivers in registered vehicles. More than 600 miles of these roads are currently open year round. There are also almost 1,900 miles of roads open to all vehicles including ATVs and non-street legal motorcycles. Almost 1,800 miles of these roads are open all year.

Class of vehicles allowed on the existing road system

Motor vehicle operation on National Forest System roads is subject to both federal and state laws and regulations. National Forest Transportation System (NFTS) roads maintained by the TNF to accommodate standard four wheel passenger cars are subject to the Federal Highway Safety Act and are considered highways for purposes of National Forest transportation management and the California Vehicle Code (CVC). These roads are currently open to highway legal vehicles only.
NFTS roads maintained for high clearance vehicles are generally not suitable for standard four wheel passenger vehicles. As such, they are not subject to the Federal Highway Safety Act, are considered roughly graded roads for purposes of the CVC Division 16.5, and are generally open to all vehicle classes including off highway vehicles (OHVs). The class of vehicle able to be used on motorized NFS trails is based on existing trail width and design features and management objectives for each trail.

Class of vehicles allowed on the existing road system is an important concept that can affect OHV recreation opportunities depending on how it is implemented on the Forest. Mixed use is the combination of highway and non-highway legal vehicles on the same road. Appendix S (Mixed Use) provides a more

detailed description of mixed use and how recommendations will be made. From a recreation opportunity point of view it is clear if mixed use is not allowed on certain roads, access to OHV loop opportunities could be cut off to unlicensed vehicles and opportunities for OHV use could be diminished. The final route designation decision will identify the class of vehicle and season of use that will be allowed for each route included in the designation. The following roads were brought forward to be analyzed for motorized mixed use (mixing highway-legal vehicles with non-highway-legal vehicles).

Table 3.07-4. Roads currently authorized for highway legal vehicles being considered for mixing highway-legal vehicles with non-highway-legal vehicles

Road Number	Road Name	Length (miles)
120-08	Pendola Extension	3.6
14	Grouse Ridge	5.8
14-01	Fall Creek	2.3
14-07	Grouse Ridge CG	0.3
17	Carr Lindsey	4.3
18	Bowman (over the snow)	14.5
18-06	Blue Lake	1.0
20-12	Burlington Ridge	5.6
20-12-01	Skillman CG	0.7
20-12-03	Towle Mill	1.3
20-16	Diamond Creek	4.0
21	Washington Gaston	10
25	Cal-Ida	12.5
27	Fiddle Creek	9.9
29	Omega	6.0
29-02	Alpha	3.2
32	Chalk Bluff	2.1
34	Jouberts	11.9
35	Eureka	10.8
41	Pinoli Ridge	14.3
424-06	Lower Greenhorn	5.4
49-47	Union Flat CG	0.2
654-02	Indian Spring CG	0.9
654-03	Indian Spring Staging	0.1
738-04	Golden Quartz	0.3
843-37	Faucherie Lake	3.4
85	Rattlesnake	11.0
85-13	Lola Montez Lake	0.8
93	Gold Valley	10.9
93-02	Monarch	1.8
93-03	Pauley Creek	4.4
93-04	Hog Canyon	4.7
98	Banner Mine	8.1
01	Jackass Point	2.9

Road Number	Road Name	Length (miles)
03	Barker Pass	10.9
04	Bear Valley	6.4
05	Treasure Mtn.	10.5
06	Sawtooth	10.3
07-40	Lake of Woods	4.1
07-6	Little Truckee Parking Area	0.15
09	Haskell Peak	14.3
11	Sagehen	5.2
11-4	Sagehen SP	0.7
11-4-2	Sagehen CG	0.4
12	Yuba - Weber	17
12-2	Yuba Pass CG	0.3
12-99	South Bonta	3.5
15	Nichols Mill	8.2
261-4 and spurs	Logger CG	0.2
28	Church Creek	2.7
3-4	Niehaus	6.5
49-53	South Fork State Tract	0.2
49-54	Carvin Creek Tract	0.8
49-56	Haskell Creek Tract	0.5
52	Chapman Calpine	8.2
54	Williams Creek	12.7
541-10	Cold Canyon	1.4
5688	Bald Ridge	14.6
5708	Pole Creek	7.0
70	Pass Creek Loop	7.5
70-80	East Meadows CG	0.5
70-80-20	East Meadow CG	0.3
71	Carman Valley	11.4
72	Verdi Peak	11.7
72-2	Verdi Peak Spur	2.9
76	Austin Meadows	2.1
780-12	Carpenter Valley	14.6
86	Meadow Lake	6.1
89-33-1	Prosser Hill OHV	0.1
89-55	Rice Canyon	2.7
89-88	Old 71	0.7
10-16	Sugar Pine OHV Staging Area	0.2
16	Canyon View Loop	6.7
19	Texas Hill Mears	3.4
19-16	Hellester	8.7
24	Brimstone	2.5
24-16	Parker Flat OHV Staging Area	0.2

Road Number	Road Name	Length (miles)
24-21	Big Reservoir	0.4
33	Peavine	9.7
33-27	Peavine Spur	0.4
43	Robison Flat	5.7
43-24 and spurs	Robinson Flat Campground	0.1
44	Cavanah Deep	11.6
44-22	Last Chance	4.8
45	Monumental Creek	6.3
57	Red Star	4.7
68	Coyote Spring	5.5
88-11	Mitchell Mine	2.8
88-14	China Wall OHV Staging Area	0.2
88-30	Secret House	0.3
96	Mosquito Ridge	2.7
96-91	Ahart CG	0.4

Un-Authorized Motorized Vehicle Recreation Opportunities

In addition to the Forest Service system roads, trails and areas there are approximately 1,400 miles of routes un-authorized for motor vehicle use that are being analyzed for possible inclusion in the National Forest Transportation System as open for motor vehicle use. There are also five un-authorized areas that are being analyzed in this project for open use by motor vehicles or subject to closure.

Roads and Trails Un-authorized for motorized use: Many of these are presently being used for general motor vehicle use or OHV use and provide access to dispersed camping, hunting, and other recreation opportunities. While the Forest can not afford to add all of these routes to the National Forest Transportation System, it will be important to consider what kind of recreation opportunities, both general motorized and OHV, are being forgone and where and how, valuable routes might be retained. The amount of roads and trails with un-authorized motor vehicle use are shown in Table 3.07-5.

Table 3.07-5. Roads and trails with un-authorized use by motorized vehicles

Description	Miles
National Forest System Maintenance Level 1 roads not authorized for public use by motor vehicles, but currently being used	160.0
Temporary roads for Forest Service projects.	66.1
User created roads and trails	1,162.8
Total Un-Authorized Roads and Trails Currently Being Used by Motor Vehicles	**1,388.9**

Areas: There are currently five areas which are being used by motorized vehicles as open areas. Two of these areas (Greenhorn Creek and Eureka Diggings) are currently being used by four wheel drives, ATVs and motorcycles as play areas. Such open play areas are relatively scarce in a forested setting. Most open play areas are located at lower elevations outside of the National Forests. The other three open areas

being used are Boca, Prosser and Stampede Reservoirs. As the water levels are drawn down in these reservoirs, motor vehicles are used to access the shoreline for boating, camping, fishing and picnicking. They are typically not used as open play areas as are Eureka Diggings and Greenhorn Creek. Table 3.07-6 displays the open areas currently being used by motor vehicles.

Table 3.07-6. Areas currently being used by motorized vehicles

Area	Type of Use	Acres
Greenhorn Creek	Open Area	27
Eureka Diggings	Open Area	60
Boca, Prosser, and Stampede Reservoirs	Shoreline access on dry soils	2,589
	Total Acres	**2,676**

Cross Country Travel: Unauthorized cross country travel also still occurs on the Tahoe National Forest. This use continues since it is not prohibited by a specific Forest Order. In addition to specific roads and trails, geographic areas of the Forest have been determined to be unsuitable for motorized use. 87,000 acres have been designated as unsuitable for any motorized use and 160,000 acres have been designated as suitable for seasonal use only. These previous administrative decisions regarding land suitability for motorized use on the Tahoe National Forest are summarized in the following figure.

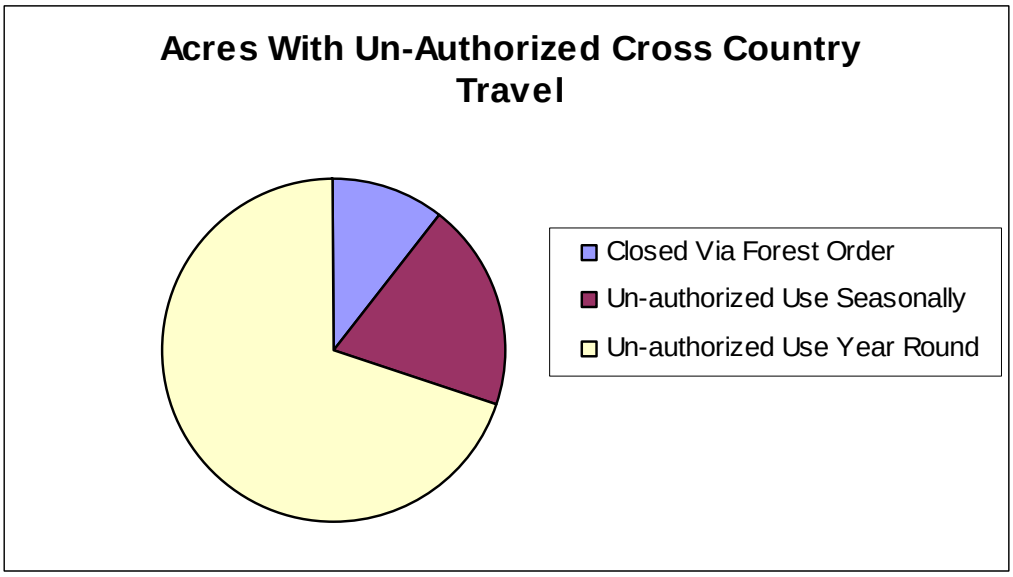

Figure 3.07-1. Un-authorized cross country travel

Approximately 86,500 acres of the Tahoe National Forest have Forest Orders prohibiting any motorized vehicle use. 156,500 acres receive un-authorized cross country use during a portion of the year and 561,400 acres have un-authorized cross country use year round.

Developed Recreation Opportunities

Developed recreation facilities attract a significant amount of the motorized recreation users. The TNF provides a wide range of facilities located in attractive settings primarily located along reservoirs or rivers. The developed facilities include: 77 family campgrounds, 12 group campgrounds, 20 picnic grounds, 35 trailheads (this includes OHV trailheads), 16 boating sites, 158 recreation residences, 8 organization camps, and 4 resorts. All of these facilities can support general motor vehicle use and can also be a base facility for OHV activities.

Non-Motorized Recreation Opportunities

Approximately one third of visitors to the Forest engages in non-motorized activities and has identified them as their primary activities. Hiking/walking is the highest activity followed by fishing, bicycling, other non-motorized, viewing natural features, relaxing, non-motorized boating, primitive camping, picnicking, viewing wildlife, backpacking, nature study, and horseback riding. These uses occur in many areas of the forest. Hiking and primitive camping are popular in Grouse Lakes Vehicle Closure Area, Castle Peak area, and Granite Chief Wilderness. The two most popular hiking trails on the forest are Loch Leven trail heading south from Big Bend and the trail to Five Lakes Basin accessed from the road to Alpine Meadows ski area. The Pacific Crest Trail provides an excellent remote hiking route that generally follows the Sierra crest and runs right down the middle of the Forest. Mountain Biking is popular across the forest and is quite popular along the trails north of Downieville, trails in the Grouse Lakes Vehicle Closure Area, the greater Truckee area and the Pioneer Trail along State Highway 20. Tables 3.07-7 and 3.07-8 display the amount of non-motorized recreation opportunities available on the Forest.

Table 3.07-7. Acres available for non-motorized recreation opportunities

Category	Acres
Open only to non-motorized use year round	86,500
Open to both motorized and non motorized use	717,900

Table 3.07-8. Trails available for non-motorized recreation opportunities

Category	Miles
Trails open to both Motorized and Non-motorized users	334.7
Trails open only to non-motorized users	286.3
Trails open only to hikers and equestrians (No mountain bikes allowed)	145.1
Un-Authorized Trails open to Motorized and Non-motorized users	897.0
Total Miles of Trails Available for Non-Motorized Use	**1,663.1**

Of the approximately 800,000 acres on the Tahoe National Forest, 86,500 are open only to non-motorized use. There are approximately 1,660 miles of trails available for non-motorized users, of these 430 miles are open only to non-motorized users.

Recreation Opportunity Spectrum

Recreation Opportunity Spectrum is a recreation planning concept adopted by the Forest Service that helps identify a range of recreation opportunities from primitive settings to urban settings. More detailed definitions of each setting can be found in the section titled “Forest Plan Management Standards and Guidelines.” On the Tahoe National Forest two areas (Granite Chief Wilderness and the North Fork

American Wild River) are managed for primitive opportunities and setting. Grouse Ridge Vehicle closure area and the North Fork American River Canyon are the primary semi-primitive non-motorized areas along with two Research Natural Areas, an Experimental Forest, and the remainder of Granite Chief roadless area north of Granite Chief Wilderness. Semi-primitive motorized areas are located in the northern third of East and West Yuba roadless areas, the Sierra Buttes area, most of the Middle Yuba roadless area, several areas adjacent to the Grouse Ridge Vehicle Closure Area, most of Castle Peak roadless area, the Loch Leven Lakes area and the North Fork of the Middle Fork American River roadless area along with several smaller areas. Roaded natural areas, which can be compared to general forest areas, can be found throughout the rest of the Forest with the exception of some areas considered rural (more developed) along Interstate 80, the city of Truckee, Highway 89 south, and developed areas between Truckee and Stampede Reservoir. As discussed above, the main issue is keeping track of semi-primitive motorized and non-motorized recreation opportunities and how road management may affect these valued recreation opportunities.

Recreation Demand

As the population of California continues to grow, the recreation demand has continued to grow on the Forest. The 1990 Forest plan indicated that there was a high demand for semi-primitive non-motorized and primitive recreation opportunities and a shortage of acres available on the Forest due its vast road system. The plan also noted a high demand for semi-primitive motorized recreation opportunities and a

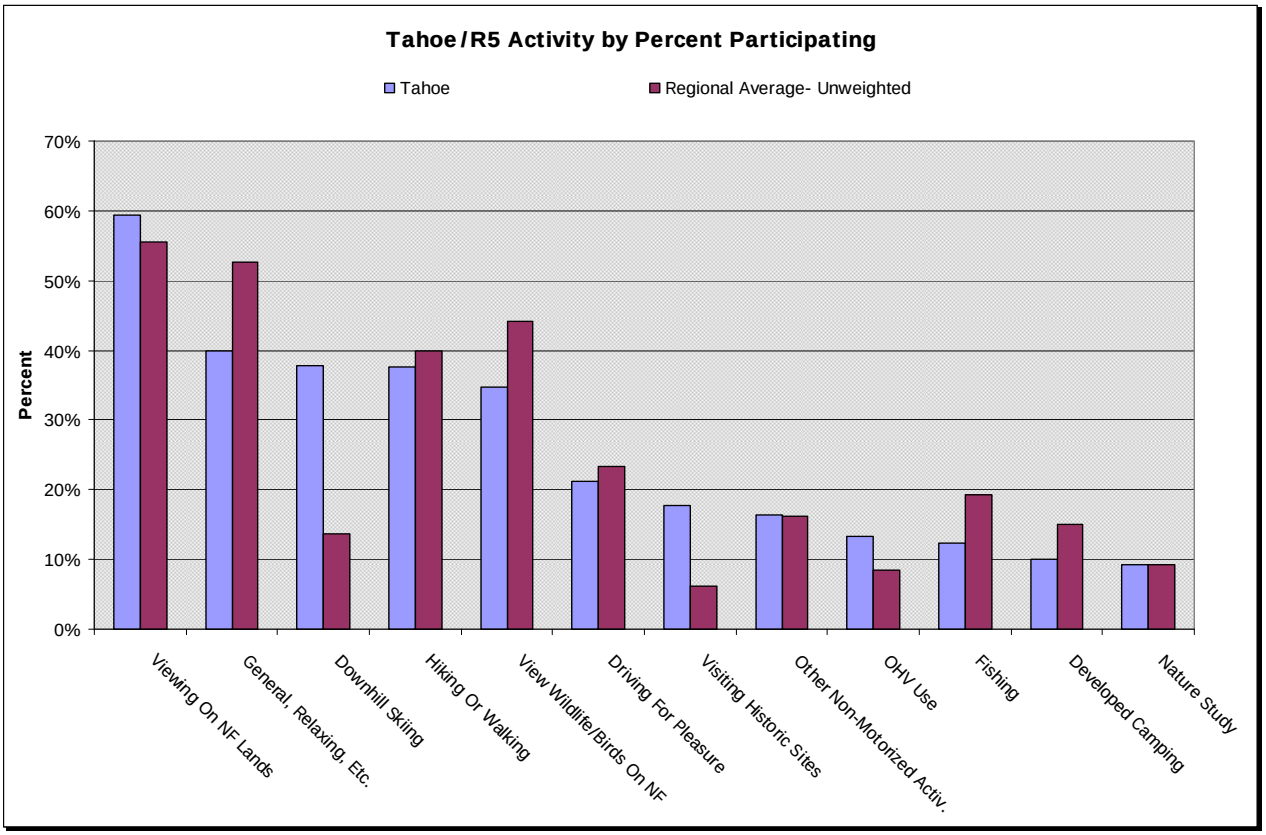

Figure 3.07-2. Visitor Activities - Forest

similar shortage of acres. With high demand for both semi-primitive motorized and non-motorized recreation opportunities it is not surprising that users have strong opinions on how trails should be allocated for either use. In some areas there are user conflicts over motorized activities compared to non-motorized activities. For example in East and West Yuba roadless areas the conflict is primarily between motorcycles and mountain bikes on certain popular trails. In other areas, the conflict is between the noise from motorized use and the desire for non-motorized users to have peace and quiet. On some trails there is a mix of use that all users seem willing to accommodate. The nearly equal demand for both motorized and non-motorized opportunities continues today and there is a concern that we manage the resource to ensure that future demand will be met.

Recreation demand is defined as what people desire when they visit the forest. Demand can be assessed in a variety of ways. First we need to look at existing uses; how people are currently using the forest. In 2001 a recreation use survey was conducted and results were summarized in a focus package. Although not always a visitors primary activity, the activities that people participate in at some point during their stay on the forest show that the ten most popular are: viewing scenery and natural features; relaxing; downhill skiing; hiking; viewing wildlife; driving for pleasure; visiting historic sites; other non-motorized activities such as swimming and water play; OHV; and fishing. Since this survey was conducted we have also seen an increase in picnicking, snowmobiling, and bicycling.

The survey asked which activities the visitor did during their visit; the visitor could check more than one activity. For Figure 3.07-2 (previous page), the X axis displays recreation activities while the Y axis shows percent participation.

We also need to look at where visitors come from, or our market zone, to understand some of their needs. Most visitors to the Tahoe National Forest are coming from local surrounding counties as well as from the greater Reno and Sacramento areas and from the Bay area.

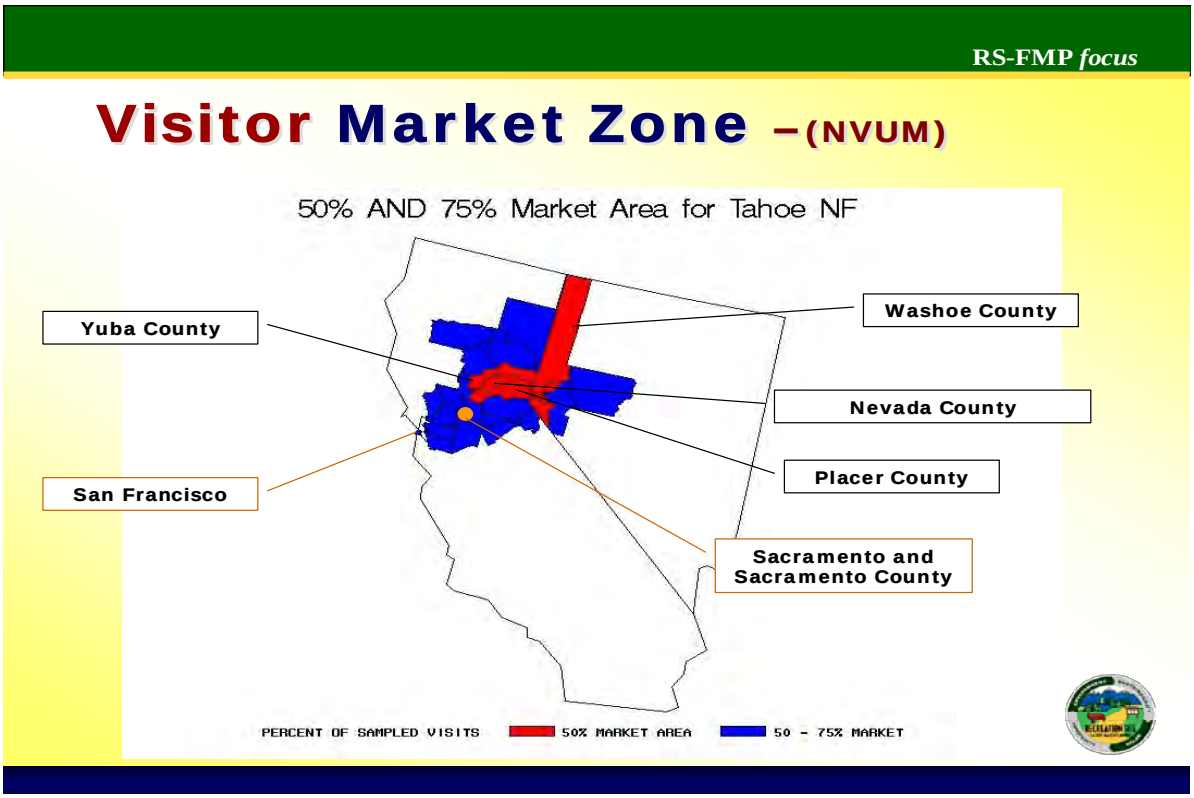

Figure 3.07-3. Tahoe National Forest Visitor Market Zone

Counties contributing larger amounts of visitation to the forest are pointed out, and San Francisco is pointed out to illustrate its proximity to the forest. The 50% cutoff distance was about 50 miles and the 75% cutoff was about 200 miles.

When we look at the type of recreation activities that are occurring in areas where our visitors live, we see that use on the forest is very similar to use in our market area. We also see the projected increase in all forms of use over the next several years.

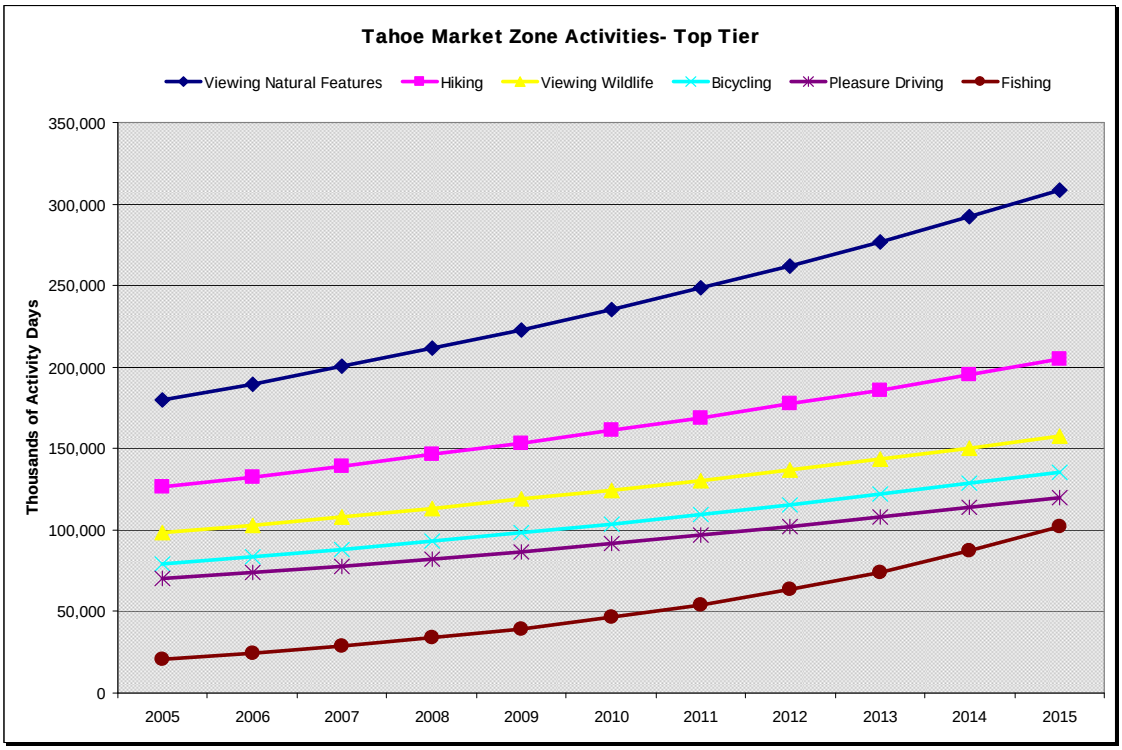

Figure 3.07-4. Tahoe National Forest Market Zone Top Tier Activities

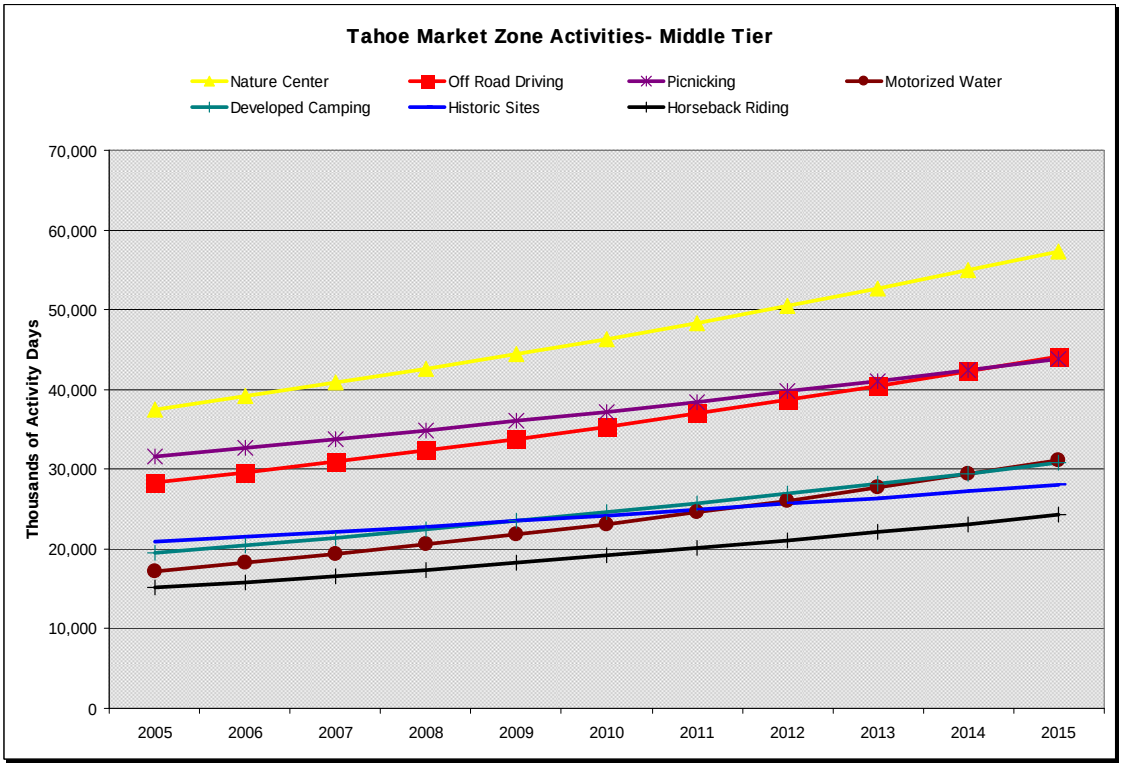

Figure 3.07-5. Tahoe National Forest Market Zone Middle Tier Activities

Demand also looks at the characteristics of our visitors. One important factor to note is the potential impact from an aging population.

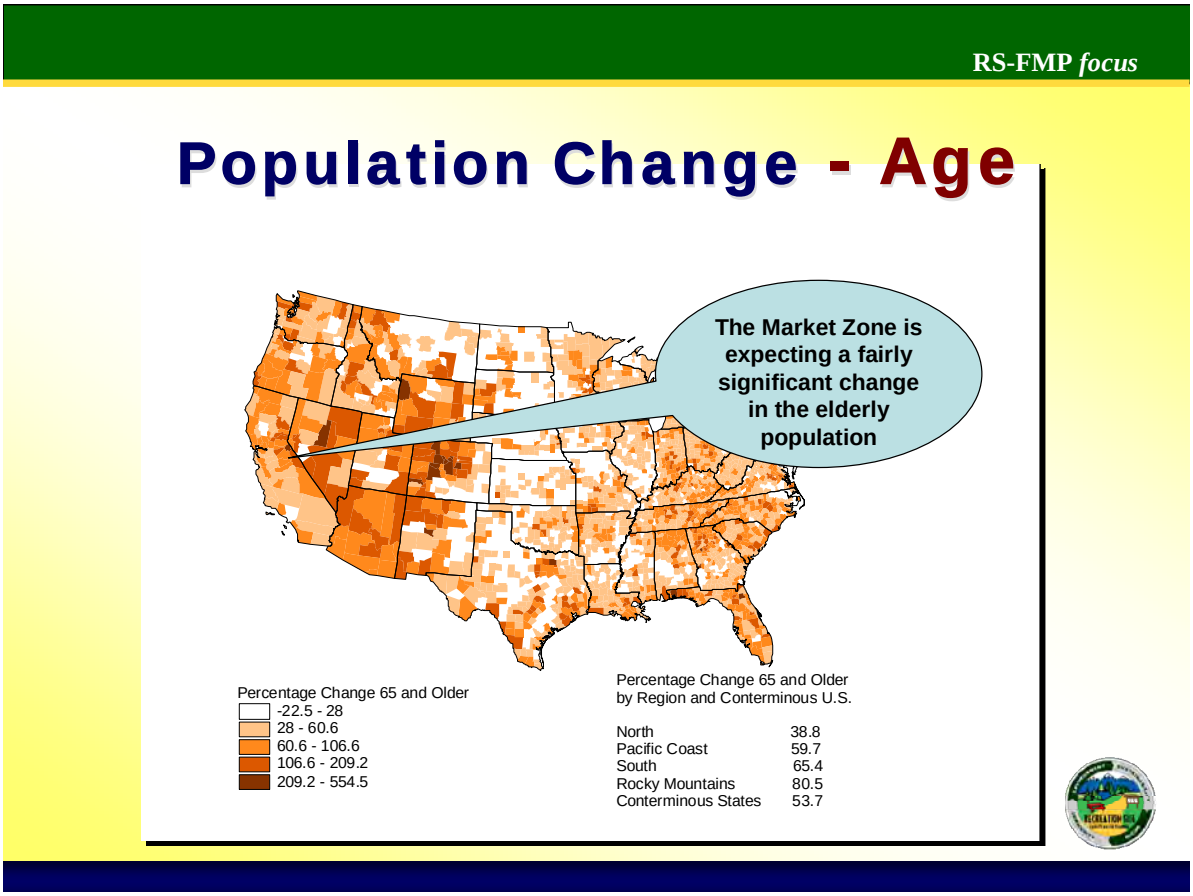

Figure 3.07-6. Tahoe National Forest Market Area Population Changes

In addition to the overall population increasing, the elderly population (65 and over) will see dramatic increases due to the Baby Boomer generation reaching retirement age starting in 2011.

Our market zone is a retirement destination and will potentially see significant increases as the Baby Boomer generation retires and relocates. CA SCORP-California's senior population will double by 2020. Additional mobility enhancements will be needed to ensure their independence and access to outdoor experiences. This generation, born and bred in prosperity, is looking for an amenity-rich and meaningful outdoor recreation experience, increasing the need for programs, facilities, and infrastructure. Boomer seniors will be drawn to conservation and heritage causes, adding much-needed capacity to California's citizen-steward ranks. They will travel extensively and participate in record numbers in second-home and RV ownership. They will assemble vast collections of digital equipment and motorized and mechanized outdoor recreation gear.

U.S. Census Bureau

As the Baby-Boom generation (those born between 1946 and 1964) starts reaching retirement age in 2011, the size of the elderly population (ages 65 and over) is projected to increase in all states. California and Florida would continue to rank first and second, respectively, in having the largest number of elderly.

There is a general changing attitude that leisure time is not a privilege, but a right earned by years of hard work. Improved health care, greater emphasis on maintaining lifelong physical fitness and a changing image of what "old" people can or cannot do are also factors that contribute to greater participation in outdoor recreation and leisure activities. They have more free time available for activities. Some are interested in continuing education and have a strong desire to learn about nature, wildlife viewing, and history/culture, for example. Some people are interested in high-risk activities, and a number of people over the age of 40 are beginning such activities as rock climbing.

Figure 3.07-7. Tahoe National Forest Projected Changes In Visitor Activities

Projected demand shows that most of the activities that are important to users of the forest today will continue to be important to users in the future. Since population projections indicate steadily increasing use by all user types, it is important to maintain opportunities for these uses.

Costs and Funding for Trail Maintenance

While OHV use has been increasing, grants from the state have started to decline in the last several years. Budgets for TNF recreation management including OHV management have also been declining over the

last few years. Maintaining the Tahoe National Forest trail system both motorized and non-motorized becomes more difficult every year. Volunteers provide significant support to maintaining trails on the Forest. However, the combination of grants, USFS money, and volunteers is not fully keeping up with maintaining the existing trail system. The ability to maintain trails through existing funding sources and volunteer efforts will be an important criterion in terms of how many additional OHV trails the Forest can add to the system.

Scenic Values

The public values scenery as an important component of their recreation opportunity on the Tahoe National Forest. The NVUM survey showed that approximately 6 percent of visitors identified viewing natural features as their main activity while 59.3 percent identified it as part of Total Activity Participation. For evaluating OHV trails, scenic values were considered in two primary ways. Where trails provided riding opportunities to scenic vistas or the trail provided scenic viewing opportunities this was identified and considered as a recreation opportunity. Where trails were visible from other key viewing points and did not blend in with the landscape, this was identified as well. The Forest has a Visual Management System that has set Visual Quality Objectives for various areas of the forest. To the degree OHV trails being considered do not meet VQOs these effects will be identified and be part of the effects analysis. The VQOs are: Preservation VQO; management activities except very low visual impact recreation facilities are prohibited. Preservation VQOs are consistent with Primitive ROS (i.e., Wilderness areas). Retention VQO; provides for management activities which are not visually evident. Partial Retention VQO; provides for management activities that remain visually subordinate to the characteristic landscape. Modification VQO; provides for management activities which may dominate the original characteristic landscape. However, such features as roads must remain visually subordinate to the broader characteristic landscape. Maximum Modification; allows for vegetative and landform alterations that dominate the characteristic landscape. However, roads must remain visually subordinate to the proposed composition as viewed in background. More detailed definitions and photos displaying the VQO concepts can be found in the National Forest Landscape Management Volume 2 Chapter 1, the Visual Management System, Forest Service, USDA, Agriculture Handbook Number 462. All of the OHV trails under consideration meet the required Visual Quality Objectives so the effects analysis will focus on the potential for aesthetic impacts.

Environmental Consequences

Off Highway Vehicle Recreation Opportunities

For environmental consequences the alternatives will be compared in general for all Off Highway Vehicle (OHV) recreation opportunities and then where appropriate specific opportunities or areas will be compared by alternative. The alternatives are listed in order of which alternative provides the most additional OHV opportunities descending to the least OHV opportunities. Alternative 1 provides the most OHV recreation opportunities followed by Alternative 5, 2, 6, 7, 4, and the least opportunities provided by Alternative 3. Other aspects of motorized opportunities and non motorized opportunities are then discussed.

Alternative 1 (No Action) allows for the most OHV opportunities

It provides 189.8 miles of National Forest System trails open to high clearance trail vehicles, of which only 5.3 miles have seasonal restrictions. It also has 17.5 miles of National Forest System trails open year round for ATVs and motorcycles and 127.4 miles open for motorcycles. Almost all (99.4%) of the National Forest System motorcycle trails are open year round.

Use would be allowed to continue on 1,388.9 miles of routes un-authorized for motorized use. To the degree these routes need maintenance and are not maintained, there could be some diminishment to the quality of OHV experiences.

- **OHV Road Opportunities**: Approximately 1,896.2 miles of native surface roads would be open to all vehicles including non-street legal ATVs and motorcycles. Of these, 1,786.1 miles (94%) would remain open year round.
- **OHV Open Area Opportunities**: Prosser Pits, Greenhorn Creek, and Eureka Diggings would be OHV open areas all year. Motor vehicles would also continue to be able to drive below the high water line at Boca, Prosser and Stampede Reservoirs to access the shoreline provided the soils were dry. All together these locations would provide 2,703 acres of OHV open area opportunities.
- **Cross Country Travel**: Cross country travel in motor vehicles could continue year round on 561,400 acres and seasonally on an additional 156,500 acres. Only 86,500 acres would be closed to cross country travel under current Forest Orders.

Alternative 5 provides for the next highest level of OHV opportunities

- **OHV Trail Opportunities**: Alternative 5 provides 434.1 miles of National Forest System trails open to high clearance trail vehicles, 29.4 miles open to ATVs and motorcycles, and 154.3 miles open to motorcycles. Many of the motorcycle trails are difficult routes in remote settings. All of these National Forest System trails would be subject to seasonal closures during the wet time of the year. The increases in miles above are from conversion of some unauthorized routes to NFS trails. Use on all of the remaining un-authorized routes would be prohibited.
- **OHV Road Opportunities**: The miles of National Forest System roads open to all vehicles would increase from 1,896.2 to 2,316.3. This is a 22% over the current miles of these roads available for all vehicles. This increase is due to mixed use being approved on 481 miles of passenger car roads. This provides significant OHV road opportunities and in many cases allows links to key OHV trails that provide loops and continued riding that otherwise would be chopped up into shorter segments of OHV trail or leave segments unconnected. This also provides for OHV opportunity by allowing vehicles to drive directly from a campsite to an OHV road or trail when in immediate proximity without having to trailer the unlicensed vehicle. The majority of these roads (90%) would be closed during the winter when soils are wet.
- **OHV Open Area Opportunities**: In addition to the existing open area at Prosser pits and additional open area would be designated at Greenhorn Creek bringing the total to 54 acres of designated open areas for OHV opportunities, primarily for ATVs and some motorcycles. Open areas allow for off -trail experiences within a defined location. Eureka Diggings would be closed to motorized vehicles.

  - Motorized vehicles would be prohibited from accessing the shoreline below the high water line at Boca, Prosser, and Stampede Reservoirs. This will cut off access from some OHV trails to the campgrounds along reservoir shorelines during low water conditions. As a result, non-street legal vehicles will have to be transported on trailers between these OHV trails and the campgrounds. It would also prevent some boat launching and motorized access to the water for fishing.
- **Cross Country Travel**: Cross country travel would be prohibited across the entire Forest as it is in the rest of the action alternatives.

Alternative 2 prohibits cross-country travel but provides a moderate level of OHV opportunities

Alternative 2 provides most of the OHV opportunities that the OHV community brought forward in public meetings. In general, this alternative proposes to add most of the known high quality OHV opportunities that do not have significant environmental consequences. It has significantly fewer opportunities than Alternative 5 and the No Action Alternative but more opportunities than Alternatives 6 and 7, and significantly more opportunities than Alternatives 3, and 4.

- **OHV Trail Opportunities**: Alternative 2 provides 233.3 miles of National Forest System Trails open to high clearance trail vehicles, 20.4 miles open to ATVs and motorcycles, and 153.2 miles open to motorcycles. Many of the motorcycle trails are difficult routes in remote settings. The majority of these National Forest System trails would be open all year. Use on all of the remaining routes un-authorized for motor vehicles would be prohibited.
- **OHV Road Opportunities**: The miles of National Forest System roads open to all vehicles would increase from 1,896.2 to 2,315.9 miles. This is a 22% over the current miles of these roads available for all vehicles. This increase is due to mixed use being approved on 481 miles of smooth surface roads. This provides significant OHV road opportunities and in many cases allows links to key OHV trails that provide loops and continued riding that otherwise would be chopped up into shorter segments of OHV trail or leave segments unconnected. This also provides for OHV opportunity by allowing vehicles to drive directly from a campsite to an OHV road or trail when in immediate proximity without having to trailer the unlicensed vehicle.
- **OHV Open Area Opportunities**: In addition to the existing open area at Prosser pits and additional open area would be designated at Greenhorn Creek (27 acres) and Eureka Diggings (60 acres) bringing the total 54 acres of designated open areas with OHV opportunities primarily for ATVs and some motorcycles. Open areas allow for off -trail experiences within a defined location. In addition, the Prosser, Boca, and Stampede reservoirs allow for motorized access to their lowered shoreline in this alternative. This allows for connection of some OHV trails to campgrounds along reservoir shorelines during low water conditions, allows boat launching and motorized access to the water for fishing. All total. 2,703 acres would be designated as open areas.
- **Cross Country Travel**: Cross country travel would be prohibited across the entire Forest as it is in the rest of the action alternatives.

Alternative 6 prohibits cross-country travel but provides a moderate level of OHV opportunities

Alternative 6 provides most of the OHV opportunities that the OHV community brought forward in public meetings. In general, this alternative proposes to add most of the known high quality OHV opportunities that do not have significant environmental consequences. It has significantly fewer opportunities than Alternative 5 and the No Action Alternative but more opportunities than Alternatives 7, and significantly more opportunities than Alternatives 3, and 4.

- **OHV Trail Opportunities**: Alternative 6 provides 227.1 miles of National Forest System Trails open to high clearance trail vehicles, 29.4 miles open to ATVs and motorcycles and 148.6 miles open to motorcycles. The motorcycle trails still include some difficult trails in remote settings but not as many as Alternatives 5 and 2.
  - All of these National Forest System trails would be subject to seasonal closures during the wet time of the year.
  - Use on all of the remaining routes for motor vehicle use would be prohibited.
- **OHV Road Opportunities**: These alternative increases the number of roads open to all vehicles far less than Alternatives 2 and 5 but more than alternatives 3, 4, and 7. The miles of National Forest System roads open to all vehicles would increase from 1,896.2 to 2,141.2 miles. This is a 13% increase over the current miles of roads open all vehicles. This increase is due to mixed use being approved on 276 miles of smooth surface roads. This provides significant OHV road opportunities and in many cases allows links to key OHV trails that provide loops and continued riding that otherwise would be chopped up into shorter segments of OHV trail or leave segments unconnected. This also provides for OHV opportunity by allowing vehicles to drive directly from a campsite to an OHV road or trail when in immediate proximity without having to trailer the unlicensed vehicle. However, the majority of these roads (96%) would be closed during the winter when soils are wet.
- **OHV Open Area Opportunities**: Open areas allow for off -trail experiences within a defined location. OHV open area opportunities in this alternative would be limited to the existing designated area at Prosser Pits. Greenhorn Creek and Eureka Diggings would be closed to motorized vehicles. Motorized vehicles would also be prohibited from accessing the shoreline below the high water line at Boca, Prosser, and Stampede Reservoirs. This will cut off access from some OHV trails to the campgrounds along reservoir shorelines during low water conditions. As a result, non-street legal vehicles will have to be transported on trailers between these OHV trails and the campgrounds. It would also prevent some boat launching and motorized access to the water for fishing.
- **Cross Country Travel**: Cross country travel would be prohibited across the entire Forest as it is in the rest of the action alternatives.

Alternative 7 provides a modest increase in OHV Trail Opportunities, a slight increase in OHV road opportunities, no increase in OHV open area opportunities and prohibits cross country travel

- **OHV Trail Opportunities**: Alternative 7 provides a more modest level of OHV opportunities with 214.6 miles of National Forest System Trails open to high clearance trail vehicles, 20.4 miles

open to ATVs and motorcycles and 144.7 miles open to motorcycles. The motorcycle trails still include some difficult trails in remote settings but not as many as Alternatives 5 and 2. The majority of these National Forest System trails would be open all year. Use on all of the remaining routes un-authorized for motor vehicles would be prohibited.

- **OHV Road Opportunities**: This alternative slightly increases amount of roads open to all vehicles. The miles of National Forest System roads open to all vehicles would increase from 1,896.2 to 1899.7 miles. This is an increase of less than one percent over the current miles of roads open to all vehicles. This provides fewer OHV road opportunities compared to the other alternatives. This slight increase is due to mixed use being approved on 3.4 miles of smooth surface roads. This provides only a slight increase in OHV road opportunities. OHV riding opportunities would be less continuous and less convenient with trailer needs more frequent. It will require placing non-street legal vehicles on trailers to access to key OHV trails that would otherwise provide loops. It also chops up many routes into shorter segments of OHV trails and leaves segments unconnected. This also limits OHV opportunities by not allowing vehicles to drive directly from a campsite to an OHV road or trail when in immediate proximity without having to trailer the unlicensed vehicle. A positive aspect is that the majority of these roads (94%) are open all year.
- **OHV Open Area Opportunities**: Open areas allow for off -trail experiences within a defined location. OHV open area opportunities in this alternative would be limited to the existing designated area at Prosser Pits. Greenhorn Creek and Eureka Diggings would be closed to motorized vehicles. Motorized vehicles would be prohibited from accessing the shoreline below the high water line at Boca, Prosser, and Stampede Reservoirs. This will cut off access from some OHV trails to the campgrounds along reservoir shorelines during low water conditions. As a result, non-street legal vehicles will have to be transported on trailers between these OHV trails and the campgrounds. It would also prevent some boat launching and motorized access to the water for fishing.
- **Cross Country Travel**: Cross country travel would be prohibited across the entire Forest as it is in the rest of the action alternatives.

Alternative 4 provides a modest increase in OHV Trail Opportunities, a slight increase in OHV road opportunities, no increase in OHV open area opportunities, and prohibits cross country travel

- **OHV Trail Opportunities**: Alternative 7 provides a modest level of OHV opportunities by providing 203.3 miles of National Forest System Trails open to high clearance trail vehicles, 20.4 miles open to ATVs and motorcycles and 141.6 miles open to motorcycles. None of the motorcycle trails include difficult trails in remote settings. All of these National Forest System trails would be subject to seasonal closures during the wet time of the year. Use on all of the remaining routes un-authorized for motor vehicles would be prohibited.
- **OHV Road Opportunities**: This alternative maintains the current amount of roads open to all vehicles. The miles of National Forest System roads open to all vehicles would increase from 1,896.2 to 1899.7 miles. This is an increase of less than one percent over the current miles of roads

open all vehicles. This provides fewer OHV road opportunities compared to the other alternatives. This slight increase is due to mixed use being approved on 3.4 miles of smooth surface roads. This provides only a slight increase in OHV road opportunities. OHV riding opportunities would be less continuous and less convenient with trailer needs more frequent. It will require placing non-street legal vehicles on trailers to access to key OHV trails that would otherwise provide loops. It also chops up many routes into shorter segments of OHV trails and leaves segments unconnected. This also limits OHV opportunities by not allowing vehicles to drive directly from a campsite to an OHV road or trail when in immediate proximity without having to trailer the unlicensed vehicle. All of these roads would be closed during the winter when soils are wet.

- **OHV Open Area Opportunities**: Open areas allow for off -trail experiences within a defined location. OHV open area opportunities in this alternative would be limited to the existing designated area at Prosser Pits. Greenhorn Creek and Eureka Diggings would be closed to motorized vehicles. Motorized vehicles would also be prohibited from accessing the shoreline below the high water line at Boca, Prosser, and Stampede Reservoirs. This will cut off access from some OHV trails to the campgrounds along reservoir shorelines during low water conditions. As a result, non-street legal vehicles will have to be transported on trailers between these OHV trails and the campgrounds. It would also prevent some boat launching and motorized access to the water for fishing.
- **Cross Country Travel**: Cross country travel would be prohibited across the entire Forest as it is in the rest of the action alternatives.

Alternative 3 provides the lowest level of OHV opportunities. OHV road, trail and open area opportunities are limited to existing National Forest Transportation System

All roads, trails and open areas un-authorized for motor vehicles currently being used are closed and cross country travel is prohibited. As a result, this alternative provides the least additional OHV opportunities in general and specifically for 4wd, ATVs and motorcycles compared to all the other alternatives.

- **OHV Trail Opportunities**: Alternative 7 provides the lowest level of OHV opportunities by providing 189.8 miles of National Forest System Trails open to high clearance trail vehicles, 17.5 miles open to ATVs and motorcycles, and 127.4 miles open to motorcycles. None of the trails include difficult trails in remote settings. A positive aspect is that the majority of these National Forest System trails would be open all year. Use on all of the routes un-authorized for motor vehicles would be prohibited.
- **OHV Road Opportunities**: This alternative maintains the current amount of roads open to all vehicles. This provides very few OHV road opportunities compared to the other alternatives. OHV riding opportunities would be less continuous and less convenient with trailer needs more frequent. It will require placing non-street legal vehicles on trailers to access to key OHV trails that would otherwise provide loops. It also chops up many routes into shorter segments of OHV trails and leaves segments unconnected. This also limits OHV opportunities by not allowing vehicles to drive directly from a campsite to an OHV road or trail when in immediate proximity

without having to trailer the unlicensed vehicle. A positive aspect is that the majority of these roads (99%) are open all year.

- **OHV Open Area Opportunities**: Open areas allow for off -trail experiences within a defined location. OHV open area opportunities in this alternative would be limited to the existing designated area at Prosser Pits. Greenhorn Creek and Eureka Diggings would be closed to motorized vehicles. Motorized vehicles would be prohibited from accessing the shoreline below the high water line at Boca, Prosser, and Stampede Reservoirs. This will cut off access from some OHV trails to the campgrounds along reservoir shorelines during low water conditions. As a result, non-street legal vehicles will have to be transported on trailers between these OHV trails and the campgrounds. It would also prevent some boat launching and motorized access to the water for fishing.
- **Cross Country Travel**: Cross country travel would be prohibited across the entire Forest as it is in the rest of the action alternatives.

Tables 3.07-9 through 3.07-12 compares off-highway vehicle opportunities by class of vehicle and season of use.

Table 3.07-9. Miles of OHV Trail Opportunities by Alternatives

Route Type	Time of Year	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Trail open to high clearance trail vehicles	**All Year**	184.5	226.9	184.5				208.2
Trail open to high clearance trail vehicles	**Seasonally**	5.3	6.5	5.3	203,3	434.1	227.1	6.4
	Subtotal	**189.8**	**233.3**	**189.8**	**203.3**	**434.1**	**227.1**	**214.6**
Trails open to ATVs and motorcycles	**All Year**	17.5	20.4	17.5	0.0	0.0	0.0	20.4
Trails open to ATVs and motorcycles	**Seasonally**	0.0	0.0	0.0	20.4	29.3	29.3	0.0
	Subtotal	**17.5**	**20.4**	**17.5**	**20.4**	**29.4**	**29.4**	**20.4**
Trails open to motorcycles	**All Year**	126.6	152.4	126.6	0.0	0.0	0.0	143.9
Trails open to motorcycles	**Seasonally**	0.8	0.8	0.8	141.6	154.3	148.6	144.7
	Subtotal	**127.4**	**153.2**	**127.4**	**141.6**	**154.3**	**148.6**	**144.7**
Un-authorized routes remaining open		1388.9	0	0	0	0	0	0
	Total All Routes	**1,596.2**	**253.7**	**207.3**	**223.7**	**463.5**	**256.5**	**235.0**

Table 3.07-10. Miles of OHV Road Opportunities by Alternative

Class of Vehicles Allowed	Time of Year	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Roads open to all vehicles	**All Year**	1786.1	2174.6	1786.1	0	229.9	75.6	1789.7
Roads open to all vehicles	**Seasonally**	110.1	141.4	110.3	1899.7	2086.4	2065.6	110.0
	Subtotal	**1,896.2**	**2315.9**	**1,896.2**	**1899.7**	**2316.3**	**2141.2**	**1899.7**
Roads open to highway legal vehicles only	**All Year**	601.7	213	601.7	598.3	213.1	369.9	598.3
Roads open to highway legal vehicles only	**Seasonally**	31.1	0	31.1	31.1	0	18	31.1
	Subtotal	**632.8**	**213.1**	**632.8**	**632.8**	**213.1**	**387.9**	**629.4**

Table 3.07-11. Acres of OHV Open Area Opportunities by Alternative

Area	Type of Use	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Prosser Pits	Open Area	27	27	27	27	27	27	27
Greenhorn Creek	Open Area	27	27			27		
Eureka Diggings	Open Area	60	60					
Boca, Prosser, and Stampede Reservoirs	Shoreline access on dry soils	2,589	2,589					
	Total Acres	**2,703**	**2,703**	**27**	**27**	**54**	**27**	**27**

Table 3.07-12. Acres Used for Cross Country Travel by Alternative

Type of Use	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Closed by Forest Order	86,500	804,400	804,400	804,400	804,400	804,400	804,400
Un-authorized use occurs seasonally	156,500	0	0	0	0	0	0
Un-authorized use occurs year round	561,400	0	0	0	0	0	0

This table includes National Forest System routes plus proposed routes for each alternative. Miles for each alternative are listed by route type.

Other Motorized Recreation Opportunities

There is a wide range of motorized recreation opportunities that are not focused on OHV. Examples include dispersed camping, boating, fishing, hiking, hunting, wildlife viewing and appreciation of nature. All of these activities use motor vehicles to access desired locations on the Forest but do not necessarily need or pursue 4WD opportunities. In some cases 4wd vehicles are used for access but not used for OHV opportunities. All the alternatives provide access to dispersed camping sites. Each alternative provides slightly different mileages consistent with the number of OHV routes included in the alternative. In other words, where fewer OHV trails are provided, access to dispersed camping sites is also limited. Table 3.07-13 shows the mileage comparisons by alternative. Out of all the potential motorized recreation activities, hunting and possibly fishing have a high potential to be affected, depending on the alternative because many people who participate in these activities use OHVs for access to or participation in their activity. Impacts for other motorized activities can range from the lack of ATV use on roads open to highway legal passenger cars only during hunting season to lost access to a dispersed camp site if the route to it is not identified on the map, to a lack of vehicle access to a favorite fishing spot, or motorized shoreline access at lakes and reservoirs where routes are not designated. Other motorized recreation activities may be impacted as well. In general, Alternative 1, the no action alternative, provides the greatest number of motorized opportunities because access to all dispersed sites and unauthorized routes is available. Alternative 5 provides the next highest level of opportunity because about 44% of the routes un-authorized for motor vehicles remain open to OHV use. In descending order alternatives 2, 6, 7, and 4 provide fewer opportunities for other motorized recreation including hunting and fishing on unauthorized roads than alternatives 5 and 1. Alternative 3 would provide the least number of opportunities because it prohibits motor vehicles on all routes un-authorized for that use. It should be pointed out that regardless of the alternative selected, the existing Forest Service road and trail systems will continue to provide a base of motorized opportunity including dispersed camping, and hunting and fishing with OHVs. If the

route designation process adds additional miles of road or trail to the National Forest System then additional motorized opportunities will be available for users.

Table 3.07-13. Other Motorized Recreations Opportunities by Alternative

Road/Trail Category	Season of Use	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Roads open to all vehicles	**All Year**	1,786.1	2,174.6	1,786.1		229.9	75.6	1789.7
Roads open to all vehicles	**April 1 to Dec. 31**				39.9	43.2	43.2	
Roads open to all vehicles	**Jan. 1 to Sept. 15**	5.5	5.5	5.5				5.5
Roads open to all vehicles	**May 1 to Dec. 31**	6.6	30.1	6.6	1761.9	1937.8	1912.8	6.6
Roads open to all vehicles	**May 1 to Nov. 1**	98.0	105.7	98.0	92.3	99.9	104.0	97.9
Roads open to all vehicles	**May 1 to Sept. 15**				5.5	5.5	5.5	
	Subtotal	**1896.2**	**2315.9**	**1896.2**	**1899.7**	**2316.3**	**2141.2**	**1899.7**
Roads open to highway legal vehicles only	**All Year**	601.7	213.0	601.7	598.3	213.1	369.9	598.3
Roads open to highway legal vehicles only	**May 1 to Dec. 31**	23.6		23.6	23.6	0.0	18.0	23.6
Roads open to highway legal vehicles only	**May 1 to Nov. 1**	7.5	0.0	7.5	7.5	0.0	0.0	7.5
	Subtotal	**632.8**	**213.1**	**632.8**	**629.4**	**213.1**	**387.9**	**629.4**
	Grand Total	**2529.0**	**2529.0**	**2529.0**	**2529.0**	**2529.0**	**2529.0**	**2529.0**

Non-Motorized Recreation Opportunities

There are several areas where non-motorized users are concerned about OHV use directly or indirectly affecting their activities through noise and trail wear and tear. The key areas of concern identified are East and West Yuba areas, Castle Peak area, Grouse Ridge Closure Area, and TKN-M1. In East and West Yuba the non-motorized public is interested in seeing trails available for hiking that are not heavily used by motor vehicles or mountain bikes. Alternatives 3 and 4 meet this need the best by not providing additional motorized trails in the East and West Yuba Area. Mountain bike use on certain trails in East Yuba is so heavy that motorcycle use is limited because of the constant stopping and slowing down to allow mountain bikes to pass. In the Castle Peak area, both motorized and non-motorized users are drawn to the scenic qualities and the opportunity for solitude. Some routes in alternatives 2, 5, 6 and 7 are proposed for addition in the Grouse Ridge area. Detailed effects for these three areas can be found in Chapter 3.10. TKN-M1 is a 3.6 mile trail currently used by mountain bikes and motorcycles. Under all alternatives except alternative 3, it is proposed to be designated as a motorcycle trail.

Table 3.07-14. Non-motorized recreation opportunities

Trail Category	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Trails open to motorized and non motorized users	334.7	407.0	334.7	365.3	617.8	405.1	379.7
Trails open only to non-motorized users	286.3	1,111.1	1,183.3	1,152.8	900.2	1,112.9	1,138.3
Trails open only to hikers and equestrians (No mountain bikes allowed)	145.1	145.1	145.1	145.1	145.1	145.1	145.1
Un-authorized trails open to motorized and non-motorized users	897.0	0	0	0	0	0	0

Mixed Use

In regards to mixed use, where unlicensed vehicles travel with licensed vehicles, Alternatives 2 and 5 provide the best OHV opportunities by providing an additional 481.2 miles of roads where unlicensed vehicles can operate because there is a low safety risk due to such factors as low road speed in a campground. Without these changes, it would be difficult for unlicensed vehicles to drive without transporting their OHV by trailer. Alternative 6 provides mixed use opportunities on an additional 276 miles. The remaining alternatives; 1, 3, 4 and 7 do not provide significant opportunities for mixed use and therefore provide less unlicensed OHV opportunity.

Table 3.07-15. Mixed use by Alternative

Road Number	Road Name	Length (miles)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
49-47	Union Flat CG	0.2		X			X	X	
93	Gold Valley	10.9		X			X		
25	Cal-Ida	12.5		X			X		
27	Fiddle Creek	9.9		X			X		
34	Jouberts	11.9		X			X		
35	Eureka	10.8		X			X		
93-02	Monarch	1.8		X			X	X	
93-03	Pauley Creek	4.4		X			X	X	
93-04	Pauley Creek Spur	4.7		X			X		
98	Banner Mine	8.1		X			X		
654-02	Indian Spring CG	0.9		X			X	X	
654-03	Indian Spring Staging	0.1		X			X	X	
14	Grouse Ridge	5.8		X			X	X	
14-01	Fall Creek	2.3		X			X	X	
14-07	Grouse Ridge CG	0.3		X			X	X	
17	Carr Lindsey	4.3		X			X	X	
18	Bowman	14.5		X			X	X	
18-06	Blue Lake	1		X			X	X	
20-12	Burlington Ridge	5.6		X			X	X	
20-12-01	Skillman CG	0.7		X			X	X	
20-12-03	Towle Mill	1.3		X			X	X	
20-16	Diamond Creek	4		X			X	X	
21	Washington Gaston	10		X			X		
29	Omega	6		X			X		
29-02	Alpha	3.2		X			X	X	
32	Chalk Bluff	2.1		X			X	X	
41	Pinoli Ridge	14.3		X			X		
85	Rattlesnake	11		X			X		
85-13	Lola Montez Lake	0.8		X			X	X	
424-06	Lower Greenhorn	5.4		X			X	X	
843-37	Faucherie Lake	3.4		X		X	X	X	X
01	Jackass Point	2.9		X			X	X	

Road Number	Road Name	Length (miles)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
03	Barker Pass	10.9		X			X	X	
3-4	Niehaus	6.5		X			X	X	
04	Bear Valley	6.4		X			X		
05	Treasure Mtn.	10.5		X			X	X	
06	Sawtooth	10.3		X			X		
07-40	Lake of Woods	4.1		X			X	X	
08	Pole Creek	7		X			X	X	
09	Haskell Peak	14.3		X			X		
11	Sagehen	5.2		X			X	X	
11-4	Sagehen SP	0.7		X			X	X	
11-4-2	Sagehen CG	0.4		X			X	X	
12	Yuba - Weber	17		X			X		
12-2	Yuba Pass CG	0.3		X			X	X	
12-99	South Bonta	3.5		X			X	X	
15	Nichols Mill	8.2		X			X		
28	Church Creek	2.7		X			X	X	
41	Pinoli Ridge	17.6		X			X	X	
49-53	South Fork State Tract	0.2		X			X	X	
49-54	Carvin Creek Tract	0.8		X			X	X	
49-56	Haskell Creek Tract	0.5		X			X	X	
52	Chapman Calpine	8.2		X			X	X	
54	Williams Creek	12.7		X			X	X	
70	Pass Creek Loop	7.5		X			X	X	
70-80	East Meadows CG & Spurs	0.8		X			X	X	
71	Carman Valley	11.4		X			X	X	
72	Verdi Peak	11.7		X			X	X	
72-2	Verdi Peak Spur	2.9		X			X	X	
76	Austin Meadows	2.1		X			X	X	
86	Meadow Lake	6.1		X			X		
88	Bald Ridge	14.6		X			X	X	
89-55	Rice Canyon	2.7		X			X	X	
89-88	Old 71	0.7		X			X	X	
261-4	Logger CG and spurs	3.8		X			X	X	
541-10	Cold Canyon	1.4		X			X		
780-12	Carpenter Valley	14.6		X			X		
16	Canyon View Loop	6.7		X			X	X	
19	Texas Hill Mears	3.4		X			X	X	
24	Brimstone	2.5		X			X	X	
19-16	Hellester	8.7		X			X	X	
44	Cavanah Deep	11.6		X			X		
44-22	Last Chance	4.8		X			X		
45	Monumental Creek	6.3		X			X	X	
57	Red Star	4.7		X			X	X	

Road Number	Road Name	Length (miles)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
93	Packer Saddle	0.9		X			X	X	
68	Coyote Spring	5.5		X			X	X	
33	Peavine & spur	10.1		X			X	X	
88-11	Mitchell Mine	2.8		X			X	X	
88-30	Secret House	0.3		X			X	X	
10-16	Sugar Pine OHV Staging Area	0.2		X			X	X	
24-16	Parker Flat OHV Staging Area	0.2		X			X	X	
88-14	China Wall OHV Staging Area	0.2		X			X	X	
43-24	Robinson Flat Campground	0.1		X			X	X	
43-24-01	Robinson Flat Campground	0.01		X			X	X	
43-24-01-01	Robinson Flat Campground	0.01		X			X	X	
43-24-01-02	Robinson Flat Campground	0.01		X			X	X	
96	Mosquito Ridge	2.7		X			X	X	
43	Robison Flat	5.7		X			X	X	
96-91	Ahart CG	0.4		X			X	X	
		Total	**0 miles**	**481.2 miles**	**0 miles**	**3.4 miles**	**481.2 miles**	**276.4 miles**	**3.4 miles**

Meeting Recreation Demand

If one considers purely numerical ratings, in this case, number of miles of available routes, demand can be potentially met by simply providing more miles for a type of use or by selecting the alternative that provides the most OHV opportunity. This approach, however does not take into account the type of experience a recreation user will have while participating in their activity. Factors to consider in the demand equation include setting, vegetation type, length of the route and therefore length of time for an experience, route design factors (width, steepness, etc), and opportunities for solitude, etc. Appendix F (Trail Use Survey) lists results of a 2006 survey of Tahoe National Forest trail users and demonstrates many of the characteristics that are important for a meaningful trail experience. Demand also needs to consider opportunities at all skill levels for all types of trail use for example; we need to provide easy trails for hikers/walkers as well as more challenging trails for more experienced users. The same is true for motorcycles, ATVs, 4x4s, mountain bikes and horses.

The Forest is also charged with meeting recreation demand for other motorized and non motorized uses while maintaining the trail and road system with a limited budget. This includes keeping the trails and roads in a sustainable condition; maintained for a specific type of recreation use and experience while minimizing resource damage. Another factor that needs to be considered is that many of the miles reported as unauthorized roads and trails, while used by OHVs, are not necessarily important OHV opportunities. Many of these unauthorized roads and trails were originally created by the Forest Service for assorted functional purposes such as timber sales. In many cases these roads do not provide important OHV opportunities because they are short, dead end roads that do not provide access to valued recreation opportunities such as loop trails, vistas, streams, lakes, or dispersed camping sites.

Per the National Visitor Use Monitoring report, approximately 26% of visitors use roads, trails (motorized and non-motorized) or designated OHV areas as one of their activities while visiting the Tahoe National Forest. Collectively, the overall mean satisfaction rating on a scale of 1-5 (with 1 being poor and 5 being very good) for trail condition is 4.3, for parking availability is 4.3 and for facility condition is 3.9. The satisfaction rating for roads was 4.5. Additionally, visitors generally do not feel that crowding is an issue for the majority of recreation site types. Trailheads and parking lots are generally classified as Developed Day Use sites. Trails fall in the Undeveloped Area category.

Table 3.07-16. Percent of Site Visits by Crowding Rating by Site Type for Tahoe National Forest (NVUM 2001 data)

Crowding Rating	Day Use Developed Sites	Overnight Use Developed Sites	Undeveloped Areas (GFA)	Designated Wilderness
10: Overcrowded	0.1	0.0	0.7	0.0
9	0.1	0.0	1.0	4.2
8	0.2	12.2	1.6	6.2
7	8.9	0.2	4.6	14.7
6	0.0	5.1	3.7	4.2
5	17.9	43.3	21.0	9.4
4	5.2	30.7	4.7	16.1
3	30.8	5.3	11.1	17.8
2	14.2	0.2	36.2	25.8
1: Hardly anyone there	22.7	3.1	15.4	1.7

In summary, trail users are generally satisfied with their experience both in terms of condition of roads, trails and facilities and in terms of availability and sense of crowdedness. We are meeting the current demand for road and trail opportunities.

Our approach in this analysis for meeting future demand for motorized use is to provide trail miles and quality opportunities per the final selected alternative and to provide additional sustainable opportunities, once the actions required prior to opening for each identified route are met (see Appendix A, Road Cards). The majority of the routes with listed required actions were submitted by members of the public who felt these were important routes to add because they provided a quality motorized experience. As a continuing means to meet future demand, user satisfaction will continue to be monitored as future "National Visitor Recreation Use Monitoring" surveys are completed.

All alternatives except 1and 3, have routes identified that could be open if actions required prior to opening are completed. With the limited dollars and volunteer time available, the trails that provide the best OHV opportunities will do the best job of meeting OHV recreation demand. Alternatives 5, 2, 6, and 7 in descending order do the best job at meeting OHV demand for the higher quality OHV opportunities while balancing other recreation demands and trail sustainability.

Trails Costs and Funding

The Forest maintains 1,312 miles of trails for motorized and non-motorized use. Non-motorized trails provide access to valued wild lands such as Granite Chief Wilderness, the North Fork American Wild River, and Grouse Lakes Non-motorized Area. The Pacific Crest National Scenic Trail provides hiking and equestrian opportunities over the entire length Sierra Crest portion of the Forest. Many of the Forest's trails are used by a variety of purposes, including hiking, biking, equestrian and several forms of

motorized use. Other trails are designed and built primarily for motorcycles, ATVs, or four-wheel drive vehicles. OHV use on the Forest continues to grow and is an important program that overlaps with the trails and roads program on the Forest. The Off- Highway Vehicle Grant program funded by California State Parks, Off-Highway Motor Vehicle Recreation Division, has been an important partner with the Forest for many years, providing valuable OHV trail riding opportunities, as well as camping and trailhead facilities. Off-Highway Vehicle Grants fund salaries, contracts, materials and supplies that support the Forest OHV trail program.

In FY 2005 and 2006, the Forest spent an average of approximately $115,000 of appropriated money supported by 2.7 FTEs and numerous volunteers to maintain the trail system. We intend to continue our volunteer program and to improve its organization and efficiency by focusing on recruitment, training, and support for a sustainable volunteer corps which could provide maintenance for our entire system, while meeting Forest Service standards and resource concerns. In addition to Forest Service appropriated funds, $147,000 of funds from the 2005 California State Off-Highway Vehicle program were utilized to help maintain motorized portions of the system.

Table 3.07-17. Average Costs for Trail Maintenance on motorized trails, 2006

Trail Activity	Cost per Mile - Hand Labor	Cost per Mile - Machine Maintenance
4X4	$1,200	$1,500
ATV	$1,800	$750
Motorcycle	$1,500	N/A

Alternative 5 would require the most resources (money and volunteer labor) to implement followed by Alternatives 2, 6, 7, and 4.

Scenic Values

Existing OHV activities, i.e. trails and roads, have not generated strong concerns that specific land areas are not meeting their Visual Quality Objectives. This is due to the specific and small scale nature of most of the roads and trails with one or two exceptions. However, the general public has seen tracks in meadows, hill climbs, and “bogged out” areas that they find aesthetically objectionable and have complained to Forest Service staff about their visual impacts and the accompanying resource damage concerns. It is also fair to note that many of the impacts observed by the public are caused by people breaking the law and ignoring the rules for OHV use. The alternatives will be evaluated in terms of scenic viewing opportunities and potential for site specific aesthetic impacts from OHV use.

Alternative 1 would provide the most opportunities for scenic viewing because all of the unauthorized routes and cross-country travel would be available. At the same time, this alternative would have the highest potential for the most aesthetic impacts particularly because cross country travel would be allowed and the high number of miles of roads and trails would put OHVs in or near sensitive landscapes. **Alternative 5** would provide the next highest opportunity for scenic viewing because there are still a high number of unauthorized routes proposed for use. This alternative would have a fairly high potential for aesthetic impacts on the landscape from OHV use because of the relatively high number of unauthorized roads proposed, and many of these roads would be in or near sensitive landscapes. In descending order, **Alternatives 2, 6, 7 and 4** would provide moderate levels of viewing opportunities with Alt. 2 providing more and Alt. 4 providing less. These alternatives would have a moderate potential

to see aesthetic impacts on the landscape. **Alternative 3** would provide no additional OHV opportunities for scenic viewing other than those that currently exist because no new routes are proposed. It would also provide the least potential for new aesthetic impacts since there would be no change to the route system. As mentioned earlier, many of the OHV aesthetic impacts are caused by illegal activity and therefore could occur at any time and may not be relevant to the alternative.