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3.02 BOTANICAL RESOURCES

Of the Forest Service Regions, the Pacific Southwest Region contains the largest assemblage of sensitive plant species in comparison to its land base. Of the more than 8,000 vascular plant species occurring in California, well over half occur on NFS lands. This is due to topography, geography, geology and soils, climate and vegetation. These same factors account for the exceptionally high endemic flora of the State. Over 100 plant species are found only on Forest Service lands and found no where else in the world (CNPS 2001).

Management of plant species and habitat and maintenance of a diversity of plant communities is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands must be planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species or lead to a trend toward listing or loss of viability of Forest Service Sensitive species. In addition, management activities should be designed to maintain or improve habitat for rare plants and natural communities to the degree consistent with multiple-use objectives established in each Forest Plan. Key parts of these activities include: developing and implementing management practices to ensure that species do not become threatened or endangered because of FS actions; maintaining viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on NFS lands; and developing and implementing management objectives for populations and/or habitats of rare species. The Pacific Southwest Region has over 425 rare plant species on National Forest lands.

Management decisions related to motorized travel can affect plant species, their habitats, and natural communities. Effects include, but are not limited to: death or injury to plants, habitat modification, habitat fragmentation, and degraded habitat quality caused by increased risk of weed introduction and spread, change in hydrology, increased erosion, compaction, and sedimentation, risk to pollinators, loss of vegetation, over collection, or other factors reducing or eliminating plant growth and reproduction (Trombulek and Frissell 2000). The Forest Service provides a process and standard through which rare plants receive full consideration throughout the planning process, reducing negative impacts on species, and enhancing opportunities for mitigation by developing and implementing management objectives for populations and/or habitats of sensitive species. It is Forest Service policy to minimize damage to soils and vegetation, avoid harassment to wildlife, and avoid significant disruption of wildlife habitat while providing for motorized public use on NFS lands (FSM 2353.03(2)). Management decisions related to motorized travel on NFS lands must consider effects to plant species and their habitats.

Vehicle travel is also a major factor/vector in the introduction and spread of noxious weeds. This project affects the population and distribution of these species. Additionally, the Chief of the Forest Service has determined that invasive species are one of four significant threats to forests and rangelands. The presence of these invaders affects many other resources, such as soil, wildlife habitat, and sensitive plants, so it is important to analyze and understand the effects of the project on noxious weed populations

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

Direction relevant to the proposed action as it pertains to botanical resources includes:

Forest Plan - General direction for management of Sensitive Plants under the Forest Plan is to "provide for and manage plant habitats and activities for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act (ESA) are no longer necessary" (FSM 2670.21). Section 7 of the ESA directs Federal

departments and agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats. The Standards and Guidelines outlined in the General Direction of the Sensitive Plants Interim and Recovery Management (USDA 2005a) includes: 1) Protect sensitive plants from activities which might cause them to become Federally listed as Threatened or Endangered; 2) Identify populations of sensitive plants which occur in areas planned for timber sales or "other" projects; 3) Modify planned projects to avoid or minimize adverse impacts to sensitive plants; 4) Where projects may jeopardize a sensitive plant species, perform a Biological Evaluation, botanical investigation and develop management guidelines, as necessary for the species involved; and 5) Conduct surveys and monitoring necessary to detect potentially damaging disturbances, changes in known populations and locations of new populations.

Endangered Species Act (ESA) - The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a federal agency is not likely to jeopardize the continued existence of a threatened or endangered (TE) species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible federal agency to consult the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE species to ensure management activities are not likely to jeopardize the continued existence of a TE species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical.

E.O. 13112 Invasive Species 64 FR 6183 (February 8, 1999) – The purpose of this Executive Order is to prevent and control the introduction and spread of invasive species.

Forest Service Manual and Handbooks (FSM/H 2670) - Forest Service Sensitive (FSS) species are plant species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on National Forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in a Biological Evaluation (BE) and is summarized or referenced in this Chapter.

Forest Service Manual 2670, (Interim Management Guide for *Erythronium tuolumnense*) FSM 2670 outlines the direction to prepare species management guides for sensitive plant species occurring on National Forests in Region 5. Because more information is needed in order to prepare a final species management guide for *Erythronium tuolumnense*, an interim management guide was selected as the best method of compiling existing species information and outlining future research and inventory needs. Included in this interim management guide is: available information and knowledge concerning the description of the plant; current and historic trends in habitat disturbance; coordinating requirements; interim management prescriptions; and an outline for a complete biological investigation and monitoring plan. As information is gathered from biological investigation and monitoring, this interim guide will be updated and modified, with the objective of preparing "a final species management plan.

Sierra Nevada Forest Plan Amendment (SNFPA) - The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified the following direction applicable to motorized travel management and botanical resources (USDA 2004c):

- Noxious weeds management (Management S&Gs 36-49).
- Wetland and Meadow Habitat (Management S&G 70): See Chapter 3.10 (Water Resources).
- Riparian Habitat (Management S&G 92): See Chapter 3.10 (Water Resources).
- Bog and Fen Habitat (ROD page 65, S&G #118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or

water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles.

Sensitive Plant Surveys (Corrected Errata, April 19, 2005): Conduct field surveys for TEPS plant species early enough in project planning process that the project can be designed to conserve or enhance TEPS plants and their habitat. Conduct surveys according to procedures outline in the Forest Service Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, survey results must be documented in the project file (Management S&G 125). The standards and guidelines provide direction for conducting field surveys, minimizing or eliminating direct and indirect impacts from management activities, and adherence to the Regional Native Plant Policy.

Direction relevant to the proposed action that is relevant to the management and prevention of noxious weeds includes:

FSM 2081.03 requires that a weed risk assessment be conducted when any ground disturbing activity is proposed and determine the risk of introducing or spreading noxious weeds associated with the proposed action. Projects having moderate to high risk of introducing or spreading noxious weeds must identify noxious weed control measures that must be undertaken during project implementation.

Executive Order 13112 of February 3, 1999 directs federal agencies to prevent the introduction of invasive species, detect and respond rapidly to and control such species, not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

Effects Analysis Methodology

Sensitive Plants

Existing survey data and Geographical Information System (GIS) analysis of the data was used to determine the effects of adding unauthorized routes open for public motorized vehicle use, including the parking of a vehicle within one vehicle length off of the travel way. A 200 foot distance from routes associated with sensitive plant occurrences was used to measure direct and indirect effects as an indicator because vehicle and human use on and immediately adjacent to travel routes affect or may affect rare plant populations, either directly by damage or death to individual plants (crushing, stem breaking, etc.) or indirectly by altering the habitat through soil disturbance, changes in hydrologic functioning, or by the introduction of non-native, invasive plants.

The rationale for a 200-foot analysis area from the route is related to the potential extent of damage to individual plants or habitat from vehicles and human use. Even though most motorized users do not leave their vehicles and walk more than 200 feet from the travel route, exceptions occur at vistas, points of interest (for example fishing sites), and dispersed campsites. At these locations, foot traffic may affect plants and their habitat more than 200 feet from the motorized travel route. Little information is available to definitively quantify the distance from route edge in which direct and indirect effects occur within different habitats. The establishment of a 200-foot analysis area represents a method to allow comparison between alternatives.

The effects analysis was derived from the summation of the Biological Evaluation and Noxious Weed Risk assessment, and summarized below. Both the Biological Evaluation and Noxious Weed Assessment use presence of sensitive species and noxious weeds detected during on-the-ground surveys, and the use of existing data for unsurveyed potential habitat to make final determinations of

effects to sensitive plants (project record). Since surveys of unauthorized motorized trails for plants and noxious weeds are not complete, this analysis assumes that the species is present within identified potential habitat. Even with this assumption, sensitive species may or may not be in potential habitat. In addition, it is possible for certain sensitive species to go undetected in any given area because the species did not produce aboveground structures that were visible at the time of the survey. For example, *Lewisia kelloggii* var. *kelloggii* is only visible for a few weeks after the snow melts. In many instances, the access to those potential habitats is not open because the snow has not melted in the more shaded areas of the road or trail that provides access. If the timing of the survey is not right, the sensitive plant could go undetected. All of the known occurrences of *Lewisia kelloggii* are located in season of use Zone 3 in the Hull/Trout creek area. Zone 3 opens May 15, at the most vulnerable time for this species when it is just about time to bloom.

The timing of the plant's life cycle is important for sensitive plants. They are very vulnerable when they first emerge, and before they have reproduced and stored energy for the next season. The entire known range of *Erythronium tuolumnense* and most of the range of *Allium tribracteatum* fall in Zone 2. The growing season and identification period for both of these species occur after the routes are opened, and often the impacts to the plants occur during blooming time. The timing of the seasonal openings would focus potential impacts at the most critical time.

For routes proposed for addition to the NFTS, existing information from the Stanislaus National Forest rare plant and fen files, and California Natural Diversity Database (CNDDDB) records were used to analyze the effects to known occurrences. Due to the limited data and unsurveyed routes, effects to potential habitat were calculated by using existing district records, CNDDDB records, the Inventory of Rare and Endangered Plants of California, and the Jepson Manual (Hickman 1993). Wet meadows without specific surveys are presumed to support fens and associated plant species. Therefore, any routes identified within wet meadow suitable habitat for sensitive plants have potential occupancy of rare plants (project record).

Direct effects consist of documented disturbances from motor vehicles that resulted in damage to sensitive plants by either driving off-road, or parking. Under these conditions, 30 feet from routes edge was judged a likely distance for limits of direct effects, such as trampling and crushing to sensitive plants. Plant sites and occurrences within 30 feet on either side of the route's edge are assumed to be affected.

Lava caps are unique habitats and a watchlist plant community for the Stanislaus National Forest. Open areas, such as lava caps or granitics and volcanic balds do not provide natural barriers to motor vehicle use. Lava caps are relatively level, open habitats comprised of low herbaceous vegetation and scattered low shrubs. In addition, these habitats tend to be highly roaded. Two sensitive plant taxa (i.e., three-bracted onion and Stebbin's lomatium) occur in open habitat on rocky ridges and outcrops. They grow on very thin soils and in open habitat that is quite vulnerable to OHV activity (M. Willits, personal communication, January 16, 2009). In addition, the volcanic soils are particularly subject to compaction when wet. Damage to lava caps and to sensitive plant occurrences on lava caps are documented. The number of native surface routes within lava caps is a useful means of comparing effects to sensitive plant habitat between the alternatives.

Data for meadows, fens, and riparian areas was collected from individual district records for project specific activities, and surveys in these areas are incomplete. Meadows, fens, and riparian areas provide habitat for seventeen sensitive species, including six mosses, one lichen, five moonworts, and subalpine fireweed, Pilot Ridge fawn lily, Tuolumne fawn lily, Hetch-Hetchy monkeyflower and pansy monkeyflower; all of which may be directly/or indirectly affected by routes open for public motorized vehicle use through wet areas. Habitat is susceptible to changes in hydrology, sedimentation, compaction, rutting, and exposure of bare soil. Damage to meadow habitat and to sensitive plant sites within meadow habitats is documented. For instance, on the Calaveras Ranger

District, 2 areas within fen features were found heavily impacted by OHV use, creating tracks and rutted scars with in the middle of the wettest habitats (C. Meyers, personal communication August 13, 2008). The miles of native surface routes within these habitats provide a means of comparing effects to sensitive plant habitat between alternatives.

Noxious Weeds

Data for noxious weeds was collected from district surveys and GIS records. Routes infested with invasive plant species (noxious weeds) have the potential for direct and indirect effects to sensitive plant habitat. The rationale for a 200-foot distance for the limit of indirect effects included a judgment that effects from compaction, changes to drainage patterns, and spread of invasive species from motor vehicles that compete with sensitive plants were most likely to occur within 200 feet. Invasive plant species also may have dramatic direct effects on sensitive plant habitats as well as to species biodiversity across the analysis area. Noxious weeds and other invasive plant species may also cause indirect effects to sensitive plants through competition.

Assumptions Specific to Botanical Resources

1. Motor vehicle use on and off established routes affected or potentially affects sensitive plant populations, either directly by damage or death to individual plants from wheel-traffic (stem breaking, crushing, etc.), or indirectly by altering the habitat through soil disturbance, changes in hydrologic functioning, or by the introduction of non-native, invasive plant species that can out-compete sensitive species for water, sunlight, and nutrients.
2. Motor vehicle use is unlikely to impact sensitive plant occurrences and habitats on steep or extremely rocky terrain. Motor vehicle use is more likely to impact rare plant occurrences and suitable habitat areas, such as meadows and lava caps, with gentle slopes and/or flat terrain with little or no vegetation or natural barriers to motor vehicles.
3. Without specific prevention and control measures, invasive non-native plants (weeds) will continue to spread along surfaced and native surfaced motor vehicle roads and trails, and into adjacent areas.
4. Motor vehicle use of native surface routes increases sediment production and erosion, thereby potentially adversely affecting sensitive plant habitat (for more detail, see soils or water resources sections).
5. When vehicle class is changed, impacts to native vegetation including sensitive/watchlist species do not vary significantly by alternative. Effects from all types of motor vehicles are assumed equal.
6. Based on the assumption that route proliferation will occur only in Alternative 2, future route proliferation is projected to be about 2 miles per year (project record).
7. The effects to plant communities of implementing seasonal or wet weather closures were not compared between alternatives because they cannot be quantified.

Assumptions Specific to Noxious Weeds

1. Unless indicated in the data, each “point” of weed infestation along a route was assumed to be within 200 feet of the route. This assumption is based on: 1) the fact that more than half of the weed data are five years or older; and 2) application of a conservative rate of average weed spread along a disturbed road-side, including occasional road maintenance.
2. Assume that the project is a ground-disturbing activity requiring a weed risk assessment. Assume infestations will continue. Assume a high risk of spread where no information on weed populations exists.
3. Existing weed infestations will likely spread. Rate of spread will be increased by vehicular activity. Infestations located along routes where vehicles drive will spread further along the route. Motorized vehicles will bring weed seeds and propagative parts from home areas and other areas where they traveled.

4. Consider the risk of spread to be medium if known populations of noxious weeds do not occur directly along travel routes, or occur on routes where travel is prohibited. Also, if the species that occur are in the B or C category or considered to be less invasive and already fairly well-distributed, consider the risk to be medium. Risk of introduction or spread should be considered low if existing inventories show that noxious weed populations are not present on the routes in question.

Data Sources

1. Route-specific botanical data with a focus on proposed additions to the NFTS (e.g., TE - species, meadows, lava cap features, habitats, etc.), including results of route-specific surveys of rare species.
2. Route specific inventories collected in Step 1 of Travel Management and associated tabular data sets.
3. GIS layers of the following data: routes, habitats, vegetative plant communities, soils, geology, and meadows. Information recorded in the GIS shapefiles was provided by the individual district botanist. Approximately 43% of the information was collected and recorded between 5- 10 years prior to this analysis. The remainder of the records is estimated to be between 3-5 years old.
4. Information on species status, distribution, and ecology was derived from general literature reviews, Forest Service documents and maps, California Department of Fish and Game, CNDDDB (CDFG 2008), Nature Serve (CDFG 2007), various field books, floras, and personal communications. The site surveys in conjunction with literature and input from the Forest botanists were used to determine the potential occurrence of each species and/or its habitat.

Botanical Resources Indicators

1. Number of sensitive plant sites/occurrences within 200 feet of motor vehicle routes
2. Number of documented direct impacts to sensitive plant sites/occurrences on either side of route's edge within 30 feet of motor vehicle routes
3. Miles of motorized routes passing through lava
4. Miles of motorized routes passing through meadows and riparian habitat

Noxious Weed Indicators

1. Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat

Botanical Resources Methodology by Action

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

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Forest

Indicators:

- Number of sensitive plant sites/occurrences within 200 feet of motor vehicle routes
- Number of documented direct impacts to sensitive plant sites/occurrences on either side of route's edge within 30 feet of motor vehicle routes.
- Miles of motorized routes passing through lava.
- Miles of motorized routes passing through meadows and riparian habitat.
- Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat.

Methodology: GIS analysis of existing unauthorized routes in relation to sensitive plant sites and their habitat. Site-specific analysis is documented for surveyed and unsurveyed routes and is identified within each alternative, and described in detail of how they will be implemented.

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

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicators:

- Number of sensitive plant sites/occurrences within 200 feet of motor vehicle routes.
- Number of documented direct impacts to sensitive plant sites/occurrences on either side of route's edge within 30 feet of motor vehicle routes.
- Miles of motorized routes passing through lava.
- Miles of motorized routes passing through meadows and riparian habitat.
- Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat.

Methodology: GIS analysis of existing unauthorized routes in relation to sensitive plant sites and habitat. Site-specific analysis is documented for surveyed and unsurveyed routes, and is identified within each alternative, and described in detail of how they will be implemented.

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

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicators:

- Number of sensitive plant sites/occurrences within 200 feet of motor vehicle routes.
- Number of documented direct impacts to sensitive plant sites/occurrences on either side of route's edge within 30 feet of motor vehicle routes.
- Miles of motorized routes passing through lava.
- Miles of motorized routes passing through meadows and riparian habitat.
- Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat.

Methodology: GIS analysis of existing unauthorized routes in relation to sensitive plant sites and habitat.

4. Cumulative Effects

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

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicators:

- Number of sensitive plant sites/occurrences within 200 feet of motor vehicle routes.

- Number of documented direct impacts to sensitive plant sites/occurrences on either side of route's edge within 30 feet of motor vehicle routes.
- Miles of motorized routes passing through lava.
- Miles of motorized routes passing through meadows and riparian habitat.
- Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat.

Methodology: GIS analysis of all routes and sensitive plant sites and habitat.

Affected Environment

Within the analysis area, the dominant vegetation types, starting from lower elevations of Forest and moving upward, begin with a narrow band of Foothill-Woodland vegetation (blue oak, interior live oak, black oak, gray pine, and grasslands) and a mosaic of Chaparral (whiteleaf manzanita, buckbrush, and chamise); the Sierran Yellow Pine forests (ponderosa pine, Douglas fir, black oak, and incense cedar); Sierran Montane forests which includes the Sierra Nevada mixed conifer type (ponderosa pine, sugar pine, Jeffrey pine, Douglas fir, white fir and black oak); the Upper Montane (red fir, Jeffrey pine, lodgepole pine, and western white pine); and the Subalpine forests (mountain hemlock, western juniper, and whitebark pine) (Barbour 1977, Potter 1998).

The upper montane and subalpine areas include broad expanses of chaparral consisting of huckleberry oak, greenleaf, and pinemat manzanita, interspersed with extensive areas of rock outcrop as well as numerous wet meadows and springs. Within these larger communities exists a diversity of specialized ecosystems, including slate outcrops, lava caps, riparian drainages, subalpine lakes, montane meadows, and fens. These ecosystems provide habitat for Stanislaus National Forest sensitive plant species.

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 (USDA 2004c). Plant species may be rare due to evolutionary history, basic population ecology, or effects by human activities. This situation is most likely a combination of these factors. Human activities may or may not be responsible for the current distribution and abundance of these rare species.

Since the late 1980s, sensitive plant monitoring has documented approximately 1,580 plant occurrences and the impacts to these species and their habitats. Within these occurrences are sites that may contain a number of plants. Impacts include damage from driving off-road through sensitive plant occurrences. These off-road effects are especially notable in areas of gentle to moderately sloped terrain with low-growing vegetation, such as lava caps, granitic and volcanic balds, and meadows, which are suitable habitats for many Stanislaus National Forest sensitive plant species. Sensitive plant sites located on damp or wet cliff crevices, such as the brook pocket moss, are much less vulnerable to off-road vehicle travel.

The typical vegetation associated with habitat for a majority of the documented Stanislaus National Forest sensitive plant occurrences consists of low growing shrubs and/or herbaceous plants in areas of sparse or widely spaced trees. Meadow and riparian areas also provide habitat for documented sensitive plant occurrences. The types of associated vegetation and their distribution are important characteristics for this analysis because of the role that vegetation plays in: stabilizing the soil and its capability to deter expansion of off road vehicular use. Vehicles can easily gain access into areas with low plant cover (i.e., lava caps, low chaparral, granitic and volcanic "balds", and meadows). Larger sized four-wheel vehicles have broken "trail" through natural shrub barriers as tall as 8 feet to gain access to selected local areas (USDA 2006). Areas with larger or denser vegetation are also accessed along little-used or abandoned roads, utility corridors, skid trails and temporary logging roads, which typically are not open for public motor vehicle travel.

Within the known range of the sensitive plant species known to or suspected to occur within the Stanislaus National Forest, the number of occurrences and amount of suitable habitat that were adversely affected by previous management activities and programs on private and federal lands are not fully tabulated, but are of consequence. For instance, in the past decade alone, 52% of approximately 120,548 acres of completed and pending project has undergone timber/fuels reduction and other vegetation projects (see Appendix B, Cumulative Effects Analysis). Tables 3.02-1 and 3.02-2 summarize the Sensitive Plant and Moss Species and Habitat descriptions for Sensitive Plant Taxa known or with potential to occur on the Stanislaus National Forest (CNPS 2001; CNPS 2006). No U.S. Fish and Wildlife Service listed plant species occur on the Stanislaus National Forest; therefore no consultation with the agency is required.

Table 3.02-1 Sensitive Plant Species and Habitat Description

Botanical Name	Common Name/Listings	Presence ²	Occurrence ³	Habitat Description/Landscape Group
<i>Allium jepsonii</i> ¹	Jepson's onion ALJE CNPS 1B.2	P	No	Upland and Mid Slopes
<i>Allium tribracteatum</i>	Three-bracted onion ALTR CNPS 1B.2	K	Yes	Lower Montane, Chaparral and Woodlands, Upland and Mid Slope
<i>Allium yosemitense</i>	Yosemite onion ALYO CNPS 1B.3	K	No	Lower Montane, Chaparral and Woodlands, Upland and Mid Slope
<i>Arctostaphylos nissenana</i> ¹	Nissenan's longate ARNICNPS 1B.2	P	No	Lower Montane, Chaparral and Woodlands
<i>Balsamorhiza macrolepis</i> var. <i>macrolepis</i>	Big-scale balsamroot BAMAM CNPS 1B.2	K	Yes	Lower Montane, Chaparral and Woodlands
<i>Botrychium ascendens</i> ¹	Upswept moonwort BOAS2 CNPS 2.3	P	No	Lower Montane, Moist Habitats-Meadows and Riparian Areas
<i>Botrychium crenulatum</i> ¹	Scalloped moonwort BOCR CNPS 2.2	P	No	Lower Montane, Moist Habitats-Meadows and Riparian Areas
<i>Botrychium lunaria</i> ¹	Common moonwort BOLU CNPS 2.3	P	No	Moist Habitats-Meadows and Riparian Areas, Upland Slopes
<i>Botrychium minganense</i> ¹	Mingan's moonwort BOMI CNPS 2.2	P	No	Moist Habitats-Meadows and Riparian Areas, Upland Slopes
<i>Botrychium montanum</i> ¹	Western goblin BOMO CNPS 2.1	P	No	Moist Habitats-Meadows and Riparian Areas, Upland Mid Slopes, Lower Montane
<i>Calochortus clavatus</i> var. <i>avicus</i> ¹	Pleasant Valley Mariposa lily CACLA CNPS 1B.2	P	No	Lower Montane, Upper Slopes
<i>Clarkia australis</i>	Small's southern clarkia CLAU2 CNPS 1B.2	K	Yes	Lower Montane, Chaparral and Woodlands
<i>Clarkia biloba</i> ssp. <i>Australis</i>	Mariposa clarkia CLBIA 1B.2	K	Yes	Lower Montane, Chaparral and Woodlands
<i>Clarkia lingulata</i> ¹	Merced clarkia CLLI CNPS 1B.1	P	No	Lower Montane, Chaparral and Woodlands
<i>Cypripedium montanum</i>	Mountain lady's slipper CYMO2 CNPS 4.2	K	Yes	Upland and Mid Slopes
<i>Draba asterophora</i> var. <i>asterophora</i> ¹	Tahoe draba DRASA2 CNPS 1B.2	P	No	Upland Slopes
<i>Epilobium howellii</i>	Subalpine fireweed EPHO3 CNPS 1B.3	K	No	Moist Habitats-Meadows and Riparian Areas
<i>Eriophyllum congdonii</i>	Congdon's woolly Sunflower ERCO16 CNPS 1B.2	K	No	Lower Montane, Chaparral and Woodlands, Upland and Mid Slopes
<i>Eriophyllum nubigenum</i>	Yosemite woolly sunflower ERNU6 CNPS 1B.3	K	No	Lower Montane, Chaparral and Woodlands, Upland and Mid Slopes
<i>Erythronium taylori</i>	Taylor's fawn lily ERTA CNPS 1B.2	K	No	Moist Habitats-Meadows and Riparian Areas, Upland and Mid Slopes
<i>Erythronium tuolumnense</i>	Tuolumne fawn lily ERTU CNPS 1B.2	K	Yes	Moist Habitats-Meadows and Riparian Areas, Lower Montane
<i>Horkelia parryi</i>	Parry's horkelia HOPA CNPS 1B.2	K	Yes	Lower Montane, Chaparral and Woodlands
<i>Hulsea brevifolia</i> ¹	Short-leaved hulsea HUBR CNPS 1B.2	P	No	Lower Montane, Upland and Mid Slopes

Botanical Name	Common Name/Listings	Presence ²	Occurrence ³	Habitat Description/Landscape Group
<i>Iris hartwegii</i> ssp. <i>Columbiana</i>	Tuolumne iris IRHAC CNPS 1B.2	K	No	Lower Montane, Chaparral and Woodlands, Upland and Mid Slopes
<i>Lewisia congdonii</i>	Congdon's bitterroot LECO4 CNPS 1B.3	K	No	Lower Montane, Chaparral and Woodlands, Upland and Mid Slopes
<i>Lewisia disepala</i> ¹	Yosemite lewisia LEDI3 CNPS 1B.2	P	No	Lower Montane, Chaparral and Woodlands, Upland and Mid Slopes
<i>Lewisia kelloggii</i> ssp. <i>Kelloggii</i>	Kellogg's lewisia LEKEK GLOBAL.2	K	Yes	Upland and Mid Slopes
<i>Lomatium stebbinsii</i>	Stebbin's lomatium LOST CNPS 1B.1	K	Yes	Lower Montane, Chaparral and Woodlands, Upland and Mid Slopes
<i>Lupinus gracilentus</i>	Slender lupine LUGR CNPS 1B.3	K	No	Upland and Mid Slopes
<i>Mimulus filicaulis</i>	Hetch-Hetchy monkeyflower MIFI CNPS 1B.2	K	Yes	Moist Habitats-Meadows and Riparian Areas
<i>Mimulus gracilipes</i> ¹	Slender stalked monkeyflower MIGR CNPS 1B.2	P	No	Lower Montane, Chaparral and Woodlands
<i>Mimulus pulchellus</i>	Pansy monkeyflower MIPU CNPS 1B	K	Yes	Moist Habitats-Meadows and Riparian Areas

¹ These Regional Forest's Sensitive Plant Species are not yet known to occur on the Stanislaus National Forest. However, either they are suspected to occur within the boundaries of the forest, or the Forest is within the range of the species, or occurrences are near enough to the boundaries to warrant including them on this list.

² Presence on the Stanislaus National Forest; known occurrences (K); potential to occur (P). (USDA 2006, Sensitive Plant Species)

³ Occurrence within or adjacent to proposed addition to the NFTS

Table 3.02-2 Sensitive Moss and Lichen Species and Habitat Description

Botanical Name	Common Name/Listings	Presence ²	Occurrence ³	Habitat Description/Landscape Group
<i>Bruchia bolanderi</i>	Bolander's bruchia' BRBO CNPS 2.2	K	Yes	Moist Habitats-Meadows and Riparian Areas
<i>Fissidens aphelotaxifolius</i> ¹	Brook pocket moss FIAP CNPS 2.2	P	No	Moist Habitats-Meadows and Riparian Areas, Upland and Mid Slopes
<i>Helodium blandowii</i> ¹	Blandow's bog moss HEBL CNPS 2.3	P	No	Moist Habitats-Meadows and Riparian Areas
<i>Meesia triquetra</i>	Three ranked Hump-moss METR CNPS 4.2	P	No	Moist Habitats-Meadows and Riparian Areas
<i>Meesia uliginosa</i> ¹	Broad nerved Hump-moss MEUL CNPS 2.2	P	No	Moist Habitats-Meadows and Riparian Areas
<i>Mielichhoferia longate</i> ¹	Elongate Copper-moss CNPS 2.2	P	No	Moist Habitats-Meadows and Riparian Areas
<i>Hydrothyria venosa</i>	Veiny aquatic lichen HYVE	K	Yes	Moist Habitats-Meadows and Riparian Areas

¹ These Regional Forest's Sensitive Plant Species are not yet known to occur on the Stanislaus National Forest. However, either they are suspected to occur within the boundaries of the forest, or the Forest is within the range of the species, or occurrences are near enough to the boundaries to warrant including them on this list.

² Presence on the Stanislaus National Forest; known occurrences (K); potential to occur (P). (USDA 2006, Sensitive Plant Species)

³ Occurrence within or adjacent to an addition to the NFTS

WATCHLIST PLANT SPECIES

Watchlist plant species are those species that are: locally rare; are of public concern; occur as disjunct populations; are newly described taxa; or lack sufficient information on population size, threats, trend or distribution to be included on the Regional Forester's Sensitive Plant List. These plant species make an important contribution to forest biodiversity. The Stanislaus National Forest developed a watchlist of species (Table 3.02-3 and Table 3.02-4). These watchlists are dynamic and updated as the need arises to reflect changing conditions and new information. The creation of the lists of watchlist plant species is a key step in meeting our commitment, as an agency, to maintaining biologically diverse and healthy ecosystems.

Table 3.02-3 Stanislaus National Forest Watchlist Species

Botanical Name	Common Name	Botanical Name	Common Name
<i>Acrostichum humilis</i>	mountain bent grass	<i>Lilium humboldtii</i> ssp. <i>humboldtii</i>	Humboldt lily
<i>Astragalus kentrophyta</i> var. <i>danaus</i>	Sweetwater Mtns. milk-vetch	<i>Madia yosemitana</i>	Yosemite madia
<i>Bolandra californica</i>	Sierra bolandra	<i>Meesia longiseta</i>	long-stalked hump moss
<i>Carex tompkinsii</i>	Tompkin's sedge	<i>Mielichhoferia elongata</i>	elongate copper-moss
<i>Cryptantha crymophila</i>	subalpine cryptantha	<i>Mimulus grayi</i>	Gray's monkeyflower
<i>Delphinium hansenii</i> ssp. <i>ewanianum</i>	Ewan's larkspur	<i>Mimulus inconspicuus</i>	small-flowered monkeyflower
<i>Didymodon norrisii</i>	Norris' beard-moss	<i>Mimulus whipplei</i> (extinct?)	Whipple's monkeyflower
<i>Drosera rotundifolia</i>	round-leaved sundew	<i>Orthotrichum spjutii</i>	Spjut's bristlemoss
<i>Eriogonum ovalifolium</i> var. <i>eximium</i>	brown-margined buckwheat	<i>Perideridia bacigalupii</i>	Bacigalupi's yampah
<i>Eryngium pinnatisectum</i>	Tuolumne button celery	<i>Rhynchospora capitellata</i>	beaked sedge
<i>Eryngium</i> sp. nov.	button celery, coyote thistle	<i>Silene invisus</i>	short-petaled campion
<i>Helianthemum suffrutescens</i>	Bisbee Peak rush-rose	<i>Trichostema rubisepalum</i>	Hernandez bluecurls

Table 3.02-4 Sensitive Taxa and Watchlist Species Occurrences

Common Name	Sensitive/Watchlist	Total
Big-scale balsamroot	Sensitive	6
Bolander's bruchia	Sensitive	1
Congdon's bitterroot	Sensitive	3
Congdon's woolly sunflower	Sensitive	24
Hetch-Hetchy monkeyflower	Sensitive	204
Kellogg's lewisia	Sensitive	10
Mariposa clarkia	Sensitive	152
Mountain lady's slipper	Sensitive	35
Parry's horkelia	Sensitive	129
Small's southern clarkia	Sensitive	484
Stebbin's lomatium	Sensitive	328
Taylor's fawn lily	Sensitive	1
Three-bracted onion	Sensitive	47
Tuolumne fawn lily	Sensitive	42
Tuolumne iris	Sensitive	2
Veiny aquatic lichen	Sensitive	8
Yosemite onion	Sensitive	4
Yosemite woolly sunflower	Sensitive	3
Pansy monkeyflower	Sensitive	76
Beaked sedge	Watchlist	1
Button celery	Watchlist	2
Norris' beard moss	Watchlist	1
Total		1,584

PLANT COMMUNITY GROUPS

The following discussion groups Stanislaus National Forest Sensitive Plants by the general types of habitats where they occur and/or places them into a non-specific plant community group. The plant community/ habitat grouping approach are not all inclusive. Important habitat elements necessary to the viability of a particular species may be missed. However, this grouping provides an approximation of the type of habitat each species needs and allows an evaluation of how the potential habitat is affected by motor vehicle use. Unauthorized motorized trails 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 occur within and/or near NFTS roads and trails.

Habitat for the 39 Sensitive taxa in the analysis is unevenly distributed across the analysis area. Habitat is grouped into three broad landscape types: 1) Upland and midslope habitats supporting sensitive species consist of dry rocky sites, forest openings in mixed conifer forests where edaphic (soil or substrate) limitations affect plant growth and species composition (e.g. gravelly lahar, hard

slate, granitic and volcanic balds, and serpentine soils); 2) Moist habitats and meadow and riparian areas including streamside zones, meadows, fens, seeps, and springs. Taxa included in this habitat type tend to be affected by changes in hydrology trends; and, 3) lower montane, chaparral and woodland habitats where the soils are derived from metasedimentary parent materials and support chaparral and oak woodland vegetation.

Upland and Mid Slope Habitat Descriptions for Sensitive Species

Twelve sensitive plant taxa are known or suspected to occur adjacent to proposed additions to the NFTS on upland and mid slope landscapes (Tables 3.02-1 and 3.02-2). Upland and midslope habitats include volcanic ridges and openings. Volcanic openings are often referred to as lava caps (or lahars). These openings are suitable habitat for twelve sensitive plant species, including *Allium jepsonii*, *Allium tribracteatum*, *Allium yosemitense*, *Calochortus clavatus var. avius*, *Lomatium stebbinsii*, and *Mimulus pulchellus*. *Lewisia congdonii* and *Eriophyllum nubigenum* are found on metamorphic or granitic rock outcrops, while *Lewisia disepala* can be found in pans of granitic and sandy soils, adjacent to granite outcrops. *Lewisia kelloggii ssp. kelloggii* can occur on ridge tops with sandy soils or on volcanic lava caps. *Draba asterophora var. asterophora* (not on forest), and *Eriophyllum nubigenum* both can occur on granitic rock outcrops or metamorphic rock substrate.

In forested habitat, *Clarkia australis* inhabits openings in westside ponderosa pine forests and Sierran mixed-conifer forests. *Cypripedium montanum* is associated with deeper soils and mature dense forest stands on north-facing slopes, sometimes in cutslopes of roads. *Hulsea brevifolia* occurs in sandy or gravelly soils of the red fir forest, and *Lupinus gracilentus* occurs in subalpine, lodgepole pine forests.

Allium jepsonii (Jepson's onion) has no known occurrences of this plant species. Jepson's onion grows on basalt, volcanic and serpentine outcrops, at elevations ranging from 900 to 6,000 feet elevation. Jepson's onion occurs in habitat similar to that of Stebbin's lomatium, and was surveyed for, along with other lava cap species. Although suitable habitat for this species may be affected by motorized routes, no known occurrences exist within 200 feet of the proposed additions to the NFTS.

Allium tribracteatum (three-bracted onion) is found in Tuolumne County and one occurrence is confirmed in Calaveras County on private land. 47 known plant sites occur primarily located in suitable habitats along the ridges near Crandall Peak and along Highway 108. Most of the sites occur on the Forest. All but one occurrence are found on thin volcanic soils, typically on lava caps. *Allium tribracteatum* grows in openings of chaparral and lower and upper montane coniferous forests on lava caps. Elevations range from 4,500 to 6,000'. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant sites and suitable habitat areas.

Allium yosemitense (Yosemite onion) occurs on lava caps and metamorphic rock ridges south of the Tuolumne River at elevations ranging from 1,500 to 7,000 feet. Four known occurrences of this plant species exist within the analysis area. Yosemite onion grows in chaparral, lower and upper montane coniferous forests on gravelly lahar. Lava caps are extremely fragile and subject to erosion and compaction when disturbed. Although suitable habitat areas for this species may be affected by motorized use, no known occurrences exist within 200 feet of the proposed additions to the system.

Cypripedium montanum (mountain lady's slipper) is an uncommon orchid in California. Within California it occurs in 15 counties, reaching as far south as Santa Cruz County along the coast and down into Madera County in the Sierra Nevada, although it is not continuous within this range. *Cypripedium montanum* has adapted to multiple habitats, growing in both moist and dry conditions at elevations between 600 and 4,800 feet. It is found in mesic sites on deep loamy soils within montane coniferous forest and also in relatively dry conditions on hillsides with northerly aspects in mixed conifer forests. About 48 occurrences exist between the Eldorado, Plumas, Stanislaus and Sierra National Forests and Yosemite National Park. The Stanislaus National Forest has 35 documented occurrences of this orchid species, each having fewer than ten plants each (Haas 2008). All occurrences are growing on slopes with north aspects, with less than 5 to over 45 degrees, in mixed

conifer forest under 50-90 percent canopy. The occurrence areas are described as moist, at least in the early summer months, with deep, loamy soils derived from granite. Motorized routes affect suitable habitat areas for this species, and three known sites are within 200 feet of the existing unauthorized routes.

Draba asterophora var. asterophora (Tahoe draba) is an alpine perennial forming large mats through vegetation reproduction. These plants grow in rock crevices and granite talus slopes at high elevations between 8,000 and 10,200 feet. Slopes are typically north facing and frequently hold patches of snow throughout the summer months. The most frequently cited locations for Tahoe (star) draba are characterized by extensive scree slopes of granitic material ranging in size from sand to small boulders. Seven distinct populations occur within a discontinuous distribution between Washoe County, Nevada and to Mt. Gibbs near Tioga Pass in Yosemite, CA; Mt. Rose Ski Area/ Slide Mountain; Mt. Rose; Rose Knob; Heavenly Valley (Lake Tahoe Basin Management Unit); Job's Peak (Lake Tahoe Basin Management Unit); Yosemite; and Echo Lake (El Dorado National Forest). No known occurrences of this plant species exist. Due to the lack of known occurrences, and the high elevation and inaccessible suitable habitat for this species, it will not be considered for further analysis.

Eriophyllum nubigenum (Yosemite woolly sunflower) has all known occurrences within the Merced River watershed, except three occurrences located in the Tuolumne River watershed. The Yosemite National Park occurrences are all south of the main fork Merced River and Yosemite Valley. A total of three occurrences of Yosemite woolly sunflower are known from the Stanislaus National Forest. ***Eriophyllum nubigenum*** tends to be limited to open, rocky, and shallow soils, on a metasedimentary substrate and on granitic substrates in Yosemite National Park. It is found in plant communities comprised of montane manzanita chaparral and upper montane coniferous forest at elevations ranging from 5,000 to 7,800 feet. Although numerous suitable habitat areas for this species may be affected by motorized routes, no known occurrences exist within 200 feet of proposed additions to the NFTS.

Hulsea brevifolia (short-leaved hulsea) is known to occur in Yosemite National Park. It grows in partial shade in red fir and upper montane coniferous forests, on sandy or gravelly soils. It ranges in elevation from 4,900 to 8,500 feet. It is found in Yosemite National Park along roadsides, on shoulders, road cuts, and fill slopes. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Lewisia congdonii (Congdon's lewisia) has 8 known occurrences within its geographic range. Congdon's lewisia has a disjunct distribution between the Kings River Canyon and the Merced River Canyon 50 miles to the north. All but one population are in the Merced River drainage. Elevation ranges from 2,000 to 7,000 feet. Plants are found on rock faces, cracks and ledges in rocky areas, on talus and screen, and on spoil piles of the abandoned barium mine. The Kings River population grows on granitics, while the other populations are found on metamorphics. It is found in plant communities ranging from chaparral to coniferous forest. On the Stanislaus National Forest, the only known occurrence is within the Trumbull Peak SIA. Population estimates range from less than 100 plants to over 10,000. The area can only be accessed by foot. No potential for impacts caused by motor vehicle access exists to the known occurrence and suitable habitat for this plant species.

Lewisia disepala (Yosemite lewisia) is not known on the Stanislaus National Forest. The nearest known occurrences are in Yosemite National Park. It is found in pans and shelves of granitic and sandy soils adjacent to granite outcrop in upper and lower montane mixed coniferous forest and pinyon and juniper woodlands. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Lewisia kelloggii ssp. kelloggi (Kellogg's lewisia) is found on ridge tops or open flats with sandy granitic soils or on volcanic lava caps. Kellogg's lewisia has documented occurrences but has a larger range in California. This subspecies has at least 43 known occurrences, ranging from Madera County (Sierra National Forest) to Plumas County (Plumas National Forest), including 10 occurrences in Yosemite National Park (project record). Ten known occurrences of this plant species exist within the analysis area. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant sites and suitable habitat areas.

Lomatium stebbinsii (Stebbin's lomatium) grows on lava caps between the Mokelumne and Tuolumne Rivers at elevation ranges from 3,000 to 7,000 feet. Approximately 328 known sites of *Lomatium stebbinsii* are located. Stebbin's lomatium grows in openings of chaparral and lower and upper montane coniferous forests on gravelly lahar (volcanic mud flow soils, often referred to as "lava caps"). Elevations range from 4,500 to 6,000 feet. This plant species is endemic to Tuolumne and Calaveras counties. Known populations of this lomatium range from the Mokelumne River to the Clavey River. The most extensive occurrences are found in the watersheds of the South Fork Stanislaus and North Fork Tuolumne Rivers. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant sites/occurrences and suitable habitat areas.

Lupinus gracilentus (slender lupine) grows in openings of subalpine coniferous forests and on seasonally moist slopes of lodgepole pine forest at elevations ranging from 7,500 to 11,000 feet. It is known to occur primarily at high elevations in Yosemite National Park, Mariposa, Tuolumne and Inyo Counties. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of the additions to the NFTS.

Moist Habitats – Meadows, Bogs and Riparian Areas

Fens are areas where at least 40 cm of organic soils exist in the upper 80 cm of the soil profile (USDA 2007d). This organic soil is commonly referred to as peat. The vegetation of fens varies widely and appears to be controlled by the hydrologic regime (water depth, water flow rates). The integrity of peatland systems is inherently tied to hydrologic conditions. For example, roads placed above fens may divert runoff away from the fen and the result is a de-watering of the fen. Once the water table is lowered, peat oxidization and subsequent decomposition occurs quickly thereby reducing the peat depth, altering hydrologic patterns, and resulting in a change in plant species composition (Cooper 1996). In addition, roads can act as sources of sediment input into fens. As areas dry out, plant species often change to non peat-forming species such as forbs. Since this system is reliant on groundwater, any disturbances that impact water quality or quantity are a threat.

Forest Service Botany/Range Survey Crews conducted fen and meadow surveys seasonally within the last 10 years (Project record). Fens provide unique habitats for rare plant species. As compared to other habitats, a disproportionately large number of rare species are of vascular and nonvascular plants associated with peatlands in the Sierra Nevada. This fact underscores the importance of these habitats contributing to the biological diversity of the region. Unauthorized OHV use can negatively affect fens by exposing soil and bare peat; create channels which act as a water diversions, and compact soil. Water diversions, ditches, and roads can have a substantial effect on the hydrological function and biotic integrity of fens, (Cooper 1996).

Invasion by exotic species (non-native plant species) is apparent in some peatlands in the Sierra Nevada. Such species include timothy (*Phleum pratense*) as well as exotic species common to other wetland types such as Canada thistle (*Cirsium arvense*) and dandelion (*Taraxacum officinale*). Native increasers (plants that increase after disturbance) such as *Phalacroseris bolanderi*, *Mimulus primuloides*, and *Hypericum anagalloides* often invade a fen that is overgrazed or artificially drained. Although these species are native and commonly found in low abundance in undisturbed fens, they

can be indicative of disturbance if they dominate areas previously occupied by sedges (Rocchio 2006).

Roads in Wet Areas

Meadows on the forest are the principal wetlands that are affected by roads. Forest roads can bisect meadows, separating the meadow into an upper and lower section via a large fill and culvert. This culvert can trap sediment above the crossing, aggrading the channel in the upper meadow and minimizing sediment deposition in the lower meadow where degradation of the channel occurred. The road has altered the flow and sediment regime in the meadow. Several sensitive species are found in these habitats that may be affected by sediment deposition.

The road system directly affects riparian communities where it impinges on riparian areas. Roads can indirectly affect riparian communities by intercepting surface and subsurface flows and routing these flows so that riparian areas dry up and the riparian vegetation is replaced with upland vegetation. Seventeen taxa are listed as sensitive within the Stanislaus National Forest in moist habitats such as meadows, fens, seeps, springs, and streamside zones. One known occurrence of a rare lichen *Hydrothyria venosa*, is known to occur within 30 feet of the road edge of the Stanislaus National Forest road system. Lichens occur in all types of habitats, and frequently show specific substrate preferences. They are important in soil formation. As information regarding lichen distributions in the Sierra Nevada and is incomplete, a great need exists for further study of lichen ecology and distribution. Motor vehicle use affects lichens and the habitat through damage to organisms themselves, and these threats include damage to the habitat component of clear water from introduction of sediment and possible petroleum products.

One moss, *Bruchia bolanderi*, is known to occur within 30 feet of the road edge of the Stanislaus National Forest road system. Mosses, liverworts, and hornworts (non-vascular green plants) play a crucial role in the hydrologic cycle and in the ecology of meadows and riparian areas. It is possible that unlocated mosses do occur in fens and meadows. Motor vehicles impact moss species in several ways. Sensitive plants can occur on cut and fill slopes and sometimes grow on the road surface on maintenance level 1 and 2 roads. Roads can affect the hydrology of an area, drying out some areas, concentrating runoff, and causing erosion in others. In addition, sedimentation from roads and soil compaction from road-related activities affects Sensitive plant habitat in some areas.

Sensitive Plant Species Known or Suspected to Occur in Moist Habitat

Seventeen taxa are listed as sensitive within the Stanislaus National Forest in moist habitats such as meadows, fens, seeps, springs and streamside zones (Tables 3.02-1 and 3.02-2). Only seven of these seventeen species occur, including one moss: *Bruchia bolanderi*, one lichen: *Hydrothyria venosa*, and 5 plants: *Epilobium howellii*, *Erythronium tuolumnense*, *Erythronium taylori*, *Mimulus filicaulis*, and *Mimulus pulchellus*.

Hydrothyria venosa is a rare lichen which is a combination of two different types of organisms (fungi and algae) growing together in a symbiotic relationship. It is known to occur on the Stanislaus National Forest system lands. Lichens occur in all types of habitats and frequently show specific substrate preferences. They play an important role in soil formation. As information regarding lichen distributions in the Sierra Nevada and on the Stanislaus National Forest is incomplete, a great need exists for further study of lichen ecology and distribution. Motor vehicle use affects lichens and the habitat through damage to the organisms themselves. They are also affected by the introduction of sediment and possible petroleum products into their habitat component of clear water.

Bryophytes are mosses, liverworts, and hornworts (non-vascular green plants) and they play a crucial role in the hydrologic cycle and in the ecology of meadows and riparian areas. *Bruchia bolanderi* is the only moss to occur. It is possible that the mosses occur in fens and meadows on some unsurveyed areas. Motor vehicle uses impact moss species in two ways. When mosses are crushed by vehicles,

they do not have an underground root system to help them recover as do vascular plants. In addition, water temperature is important to the photosynthetic ability of mosses. As described in SNFPA, mosses can photosynthesize effectively at temperatures as low as 33 degrees (F), compared to a lower limit of about 50 degrees for vascular plants (USDA 2004c). Mosses stop photosynthesizing effectively at an upper limit of about 77 degrees, in contrast to vascular plants which some can photosynthesize at temperatures of up to 100 degrees. When moss layers are disturbed by vehicle use, it is possible that water temperatures can go up due to hydrologic disruption (USDA 2004c).

Ten species are thought to occur within suitable habitat areas, but were not located. They include the five species of the moonwort complex that are widely distributed in North America. In California, they occur infrequently in a variety of moist habitats throughout the Sierra Nevada and other portions of the state. Moonwort species are difficult to distinguish from each other and all have similar habitat preferences (wet or moist soils such as in meadows and fens or along the edges of lakes and streams). The moonworts include *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium lunaria*, *Botrychium minganense*, and *Botrychium montanum*. The remaining five taxa not located include *Fissidens aphelotaxipholius*, *Helodium blandowii*, *Meesia triquetra*, *Meesia uliginosa*, and *Mielichhoferia elongata*.

Moist Habitat Descriptions for Sensitive Species

Botrychium ascendens (upswept moonwort) is found in lower montane coniferous forest, meadows and seeps from approximately 4,900 to over 7,500 feet in elevation. Upswept moonwort is not identified on the Stanislaus National Forest.

Botrychium crenulatum (scalloped moonwort) is found in fens, lower montane coniferous forest, meadows, seeps, and freshwater marches from approximately 4,900 to over 10,500 feet in elevation. Scalloped moonwort is not identified on the Stanislaus National Forest. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Botrychium lunaria (common moonwort) is found in meadows, seeps, and in subalpine and upper montane coniferous forest from approximately 7,450 to over 11,000 feet in elevation. Common moonwort is not found on the Stanislaus National Forest. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Botrychium minganense (Mingan moonwort) is found in fens and in lower and upper montane coniferous forest from approximately 4,900 to over 6,750 feet in elevation. Mingan moonwort is not identified within the Stanislaus National Forest. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Botrychium montanum (mountain moonwort) is found in lower and upper montane coniferous forest, meadows, and seeps from approximately 4,900 to 7,000 feet. No occurrences exist on the Stanislaus National Forest. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Bruchia bolanderi (Bolander's bruchia) is a moss known from 21 occurrences documented in California since 1980 with the majority in the Sierra Nevada Mountains. *Bruchia bolanderi* previously thought to be endemic to California and Oregon was recently found in Nevada and Utah. California populations are known from Fresno, Tulare, Madera, Mariposa, Modoc, Nevada, Tuolumne, Tehama and Plumas counties. This moss is documented within the Plumas, Stanislaus, Sierra, and Eldorado National Forests. Habitat for Bolander's bruchia includes meadows, fens, springs, seeps, and damp soil in montane and subalpine coniferous forests from about 5,500 to 9,250

feet. It grows in ephemeral habitats such as erosion ditches or small streamlets through wet meadows and at the edges of fens, and seems capable of reestablishing itself in recently disturbed soils. One known occurrence and numerous suitable habitat areas exist on Stanislaus National Forest. Existing routes pass through or are within 200 feet of suitable habitat and one plant occurrence of this plant species may be affected by motor vehicle use.

Epilobium howellii (subalpine fireweed) occurs in wet meadows, streamside and mossy seeps in upper montane and subalpine coniferous forest, consistent with silty sites under part or near-full shade, with little competition. The meadows and seeps where this species occurs can easily be entered with late seasonal OHV use. Known occurrences exist, however, none are within 200 feet of proposed additions to the NFTS and existing NFTS.

Erythronium taylori (Pilot Ridge fawn lily) is known from only one occurrence discovered on unique cliff formations in the Groveland Ranger District. The occurrence is restricted to isolated cliff-like rock outcrops in a north-facing, cool, damp, shaded microclimate, within the mixed conifer forest at approximately 4,200 feet. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Erythronium tuolumnense (Tuolumne fawn lily) grows on a variety of substrates and under a variety of canopies. It is found primarily on north facing slopes with rocky soils. It also grows in ephemeral drainages on very steep slopes and it is associated with intermittent or perennial streams on less steep slopes. It is found at elevations ranging from about 1,600 to 4,880 feet. Currently it is known from Deer Creek, the North Fork Tuolumne River and the South Fork Stanislaus River. Three occurrences are known on private lands. Approximately 42 known occurrences exist ranging in size from several individuals to more than 10,000 individuals. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant sites/occurrences and suitable habitat areas.

In accordance with the Stanislaus National Forest 1990, Interim Management Guide for ***Erythronium tuolumnense***, “soil compaction and soil movement appear to be the greatest threats, by reducing the vigor of the individuals and reducing the numbers of individuals within the population. This could lead to a conflict with such activities as timber harvesting, reforestation, mining, grazing, recreation, road building and improvements, and fuelwood gathering. Plant collecting and hydroelectric development also impacts the species.”

Fissidens aphelotaxipholius (brook pocket moss) is known to occur in wet soil, humus and rocks along narrow streams in the vicinity of small waterfalls; damp or wet crevices or cliffs; upper montane coniferous forest from about 6,000 to 7,200 feet. Although numerous suitable habitat areas for this species may be affected by the location of motorized routes, no known occurrences exist within 200 feet of proposed additions to the NFTS.

Helodium blandowii (Blandow’s bog moss) is known to occur near the forest boundaries of Kennedy Meadows, fens and seeps in subalpine conifer forest and alpine lakes at 6,000 to 9,000 feet. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Hydrothyria venosa (veined water lichen) is known to occur on the western slope of the Sierra Nevada, the north coast range, northwestern California, Oregon, Washington, and British Columbia and in several eastern states. In the Sierra Nevada, it is known from the Stanislaus, Plumas, and Sequoia National Forests and Calaveras Big Trees State Park. Other California occurrences include Shasta-Trinity and Mendocino National Forests. Within the Sierra Nevada, Veined water lichen is found in cold, unpolluted streams in mixed conifer forests. The water is very clear and peak flows are not of the intensity that would lead to scouring. The streamlets have a rich aquatic bryophyte flora

and rarely are more than 8 inches in depth. It occurs at elevations ranging from 3,000 to 9,000 feet. Known occurrences exist. Although numerous suitable habitat areas for this species may be affected by the location of motorized routes, 3 known occurrences are within 200 feet of proposed additions to the NFTS.

Meesia triquetra (three-ranked hump-moss) is usually associated with Sphagnum and cold springs or seeps, between 4,000 and 9,000 feet. No known occurrences exist on the Stanislaus National Forest. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Meesia uliginosa (broad-nerved hump-moss) occurs in meadows and fens on dead/decomposing wood, usually in the subalpine zone, between 4,000 and 9,500. No known occurrences of this moss exist on the Stanislaus National Forest. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Mielichoferia elongata (elongate copper-moss) occurs in all types of seasonally or perennially moist rock outcrops, often with high copper or heavy metal content, at lower elevations of foothill woodland, and occasionally coniferous forest. No known occurrences of this moss exist on the Stanislaus National Forest. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Mimulus filicaulis (Hetch-Hetchy monkeyflower) occurs in meadows, seeps, and seasonally wet road cuts between the elevations of 2,000 and 5,500 feet. Although a moist germinating species, it also occurs on sites that dry out substantially in the summer, often within mixed-conifer stands. It germinates in early spring and dies soon after blooming, setting seed in late spring. In very dry years, *Mimulus filicaulis* occurrences might not bloom at all. The known range for this species is the Main Fork Tuolumne River south to Mariposa District of the Sierra National Forest and east into Yosemite National Park. Approximately 204 known sites exist within the Stanislaus National Forest. All of the documented occurrences are on the Groveland Ranger District. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant sites/occurrences and suitable habitat areas.

Mimulus pulchellus (pansy monkeyflower) grows in vernal wet to moist sites, which are usually flat, or with a slight slope, often on volcanic lava caps and granitic substrates. The elevational range is 2,000 to 6,500 feet. The times for germination and identification are in early spring from late April through June, depending on elevation and weather conditions. It occurs in Calaveras, Mariposa and Tuolumne Counties in the Stanislaus National forest, Yosemite National Park and near the town of Mariposa. It occurs in the Chowchilla River watershed (near Mariposa) and the Merced, Stanislaus and Tuolumne River watersheds. Approximately 76 known sites of this species exist on the Stanislaus National Forest. It is observed in roads and routes driven in early spring. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant occurrences and suitable habitat areas.

Lower Montane, Chaparral and Woodland Habitats

Six Sensitive Plant Species occur in the lower montane chaparral, and woodland habitats (Table 3.02-1): *Balsamorhiza macrolepis* var. *macrolepis*, *Clarkia biloba* ssp. *australis*, *Clarkia lingulata*, *Eriophyllum congdonii*, *Horkelia parryi*, and *Iris hartwegii* ssp. *columbiana*. One additional species, *Arctostaphylos nissenana*, occurs in lower montane, chaparral and woodland habitats, but has no known occurrences within the analysis area.

Lower Montane, Chaparral, and Woodland Habitat Descriptions for Sensitive Species

Arctostaphylos nissenana (Nissenan manzanita) is found in the lower Sierra Nevada foothills of the knobcone pine and chaparral habitats. It is typically found in areas with slate or shale rock types and associated soils. It ranges in elevation from 1,450 to 3,650 feet. Although it is known from the Eldorado National Forest, it is not found on the Stanislaus National Forest in suitable habitat areas. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Balsamorhiza macrolepis var. macrolepis (big-scale balsamroot) is found in the Sierra Nevada Foothills from Tehama County south to Mariposa County and the interior Coast Range from Tehama County (Mendocino National Forest) south to Santa Clara County. It inhabits a variety of soil and plant community habitats, including ponderosa pine forests, chaparral, vernal moist meadows and grasslands, and grasslands within oak woodland. Substrates are usually sandstone, serpentine, or basalt outcrop. The Bureau of Land Management (BLM) occurrence in Mariposa County occurs on rocky clays of metasedimentary origin. It is usually found in openings or under an open brush cover. The elevation range is listed as below 4,600 feet. One known occurrence of *Balsamorhiza macrolepis var. macrolepis* on the Stanislaus National Forest is located in the Middle Fork Fuel Reduction and Forest Health Project analysis area. No occurrences of this plant species are within 200 feet of proposed additions to the NFTS.

Clarkia australis (Small's southern clarkia) is typically found on slopes with a south, southwest, or southeast aspect. It grows in openings in ponderosa pine and mixed-conifer stands often in association with bear clover. *Clarkia australis* tends to prefer "disturbed" sites – e.g. sites with little or no competition from more aggressive weedy species. In the natural setting, fire is the typical disturbance agent. It grows in open areas (sun or lightly filtered sun) within manzanita stands. When not associated with bear clover, the species is usually observed growing in bare mineral soil or with a very light layer of leaf litter at elevations between 2,500 and 6,000 feet. All but three known occurrences of *Clarkia australis* occur on the Groveland Ranger District (Haas 2008). One occurrence is known from private property within the boundaries of the Forest. Two other occurrences are known in Yosemite National Park, near the boundary with the Stanislaus National Forest. Approximately 484 known sites of this species exist on the forest. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant occurrences and suitable habitat areas.

Clarkia biloba ssp. australis (Mariposa clarkia) is most often found on north, northeast or northwest-facing slopes, usually under light shade. It is occasionally found on southwest or southeast-facing slopes, sometimes in direct sunlight. *Clarkia biloba ssp. australis* tends to prefer "disturbed" sites, e.g. sites with little or no competition from more aggressive weedy species. In the natural settings, fire is the common disturbance agent. The elevational range is approximately 1,500 to 4,600 feet. Approximately 152 known sites of *Clarkia biloba ssp. australis* exist on the Stanislaus National Forest. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant occurrences and suitable habitat areas.

Clarkia lingulata (Merced clarkia) is known from only two populations, both found on the Merced River in Mariposa County at around 1,500 feet elevation on the south side of the Merced River. The two occurrences are approximately two miles apart in the Merced River Canyon near the confluence with South Fork Merced River. It grows in the mixed chaparral/woodland habitat in the Merced River drainage. It does not appear to be limited by soils, geology, or other biotic or abiotic habitat components. Numerous suitable habitat areas for this species were identified through GIS analysis and may be affected by use on motorized routes. No known occurrences exist within 200 feet of proposed additions to the NFTS.

Eriophyllum congdonii (Condon's woolly sunflower) is found in chaparral, woodland, and lower montane coniferous forest on metamorphic rock ridges and outcrops. It is also found in valley and foothill grasslands, south of the Tuolumne River and east of Pilot ridge at 1,600 to 6,235 feet in elevation. 24 known sites of this plant species exist on the Stanislaus National Forest. Many of the proposed additions to the NFTS pass through or are within 200 feet of suitable habitat areas.

Horkelia parryi (Parry's horkelia) is known to inhabit Amador, Calaveras, El Dorado, and Mariposa counties. It grows on stony, disturbed, slightly acidic soils under open canopies in chaparral and cismontane woodland below 3,400 feet. It is documented on the Eldorado National Forest to co-habitat with Nissenan manzanita. It is often found on Ione formation soils. It colonizes disturbed sites such as abandoned roads where the canopy is open. The Eldorado National Forest has four known occurrences. Many of the proposed additions to the NFTS pass through or are within 200 feet of plant occurrences and suitable habitat areas.

Iris hartwegii ssp. columbiana (Tuolumne iris) has three occurrences on Stanislaus National Forest, one occurrence on BLM lands, and two occurrences on private lands in Tuolumne and Calaveras Counties. Two of these occurrences are in the watershed of the South Fork of the Stanislaus River. It grows on dry, open or partially shaded slopes in foothill woodlands and yellow pine forests. It occurs at elevations ranging from, 350 to 5,000 feet. Proposed additions to the NFTS pass through or are within 200 feet of suitable habitat areas. Two occurrences of the Tuolumne iris are within 200 feet of proposed additions to the NFTS.

Existing road densities may contribute significantly to fragmentation and erosion damage of special habitats such as aspen, meadows, oak woodlands, lavacaps, and Sensitive plant occurrences. Based on the analysis, unauthorized roads account for a disproportionate amount of adverse effects to Sensitive plants. A portion of the roadside management zone has known Sensitive plant occurrences that may be intolerant to ground-disturbing activities. A review of sensitive plant occurrences suggests that for some species, up to 81% of all known occurrences intersect roads (USDA 2003b). The proposed additions to the NFTS have direct impacts on approximately 9% of the sensitive plant species occurring in the analysis area. These plant species are analyzed in the effects section of each alternative.

Plant communities may continue to be negatively impacted by motorized routes not added to the NFTS for a period of time after the motorized use is stopped if erosion from the motorized trail is not reduced and/or eliminated. Use of unauthorized routes by nonmotorized uses such as hiking, mountain biking, and horseback riding traffic may prevent vegetative recovery. Native vegetative cover protects against erosion and maintains infiltration capacity of the soil (Switalski 2004). Surveys of unauthorized routes (and those NFTS roads and trails used to access them) showed some level of erosion. Therefore, it is important to estimate how long it might take unauthorized routes not added to the NFTS might need to recover once use has stopped. The rate of passive recovery of any unauthorized route 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 motor vehicle use.

NOXIOUS AND INVASIVE WEED SPECIES

Invasive grasses, such as cheatgrass (*Bromus tectorum*), and forbs, such as knapweeds (Centaurea species), have invaded over 50 million hectares of the region (western U.S.), reducing biodiversity by displacing native plants and animals (Mack 1989; Zouhar 2003). Noxious weeds are defined in as "those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible State official (FSM 2080.5). Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being nonnative or new to or not common to the United States or parts thereof."

Table 3.02-5 Noxious Weeds and Non-native Invasive Plants

Common Name	Botanical Name	Annual/Perennial	CA Weed Status ¹	CA Invasive Plant Council ²
Russian knapweed	<i>Acroptilon repens</i>	Perennial	BW	Moderate
Jointed goatgrass	<i>Aegilops cylindrica</i>	Annual grass	BW	--
Barbed goatgrass	<i>Aegilops triuncialis</i>	Annual grass	BW	High
Tree-of-heaven	<i>Ailanthus altissima</i>	Deciduous tree	Non-native	Moderate
Giant reed	<i>Arundo donax</i>	Perennial grass	Non-native	High
Black mustard	<i>Brassica nigra</i>	Perennial	Non-native	Moderate
Cheatgrass	<i>Bromus tectorum</i>	Annual grass	Non-native	High
Hoary cress	<i>Cardaria draba</i>	Perennial	BW	Moderate
Whitetop	<i>Cardaria pubescens</i>	Perennial	BW	Limited
Italian thistle	<i>Carduus pycnocephalus</i>	Annual	CW	Moderate
Slenderflower thistle	<i>Carduus tenuiflorus</i>	Annual	CW	Limited
Smooth distaff thistle	<i>Carthamnus baeticus</i>	Annual	BW	--
Woolly distaff thistle	<i>Carthamnus lanatus</i>	Annual	BW	Moderate
Purple starthistle	<i>Centaurea calcitrapa</i>	Annual to Perennial	BW	Moderate
Diffuse knapweed	<i>Centaurea diffusa</i>	Annual to Perennial	AW	Moderate
Iberian starthistle	<i>Centaurea iberica</i>	Annual to Biennial	AW	--
Spotted knapweed	<i>Centaurea maculosa</i>	Perennial	AW	High
Tocalote/ Malta starthistle	<i>Centaurea melitensis</i>	Annual	Non-native	Moderate
Yellow starthistle	<i>Centaurea solstitialis</i>	Annual	CW	High
Squarrose knapweed	<i>Centaurea virgata ssp. squarrosa</i>	Perennial	AW	Moderate
Rush skeletonweed	<i>Chondrilla juncea</i>	Perennial	AW	Moderate
Canada thistle	<i>Cirsium arvense</i>	Perennial	BW	Moderate
Bull thistle	<i>Cirsium vulgare</i>	Biennial	Non-native	Moderate
Field bindweed	<i>Convolvulus arvensis</i>	Perennial Vine	CW	--
Bermuda grass	<i>Cynodon dactylon</i>	Perennial	CW	Moderate
Scotch broom	<i>Cytisus scoparius</i>	Deciduous Shrub	Non-native	Moderate
Quackgrass	<i>Elytrigia repens</i>	Perennial Grass	BW	--
Leafy spurge	<i>Euphorbia esulus</i>	Perennial	AW	High
Oblong spurge	<i>Euphorbia oblongata</i>	Perennial	BW	High
Fennel	<i>Foeniculum vulgare</i>	Perennial	Non-native	High
French broom	<i>Genista monspessulana</i>	Deciduous Shrub	CW	High
Hydrilla	<i>Hydrilla verticillata</i>	Aquatic herb	AW	High
Klamath weed	<i>Hypericum perforatum</i>	Perennial	CW	Moderate
Dyers woad	<i>Isatis tinctoria</i>	Perennial	BW	Moderate
Tall whitetop/ perennial pepperweed	<i>Lepidium latifolium</i>	Perennial	BW	High
Oxeye daisy	<i>Leucanthemum vulgare</i>	Perennial	Non-native	Moderate
Dalmation toadflax	<i>Linaria genistifolia ssp. dalmatica</i>	Perennial	AW	Moderate
Purple loosestrife	<i>Lythrum salicaria</i>	Perennial	BW	High
Parrot feather watermilfoil	<i>Myriophyllum aquaticum</i>	Aquatic Herb	Non-native	High
Eurasian milfoil	<i>Myriophyllum spicatum</i>	Aquatic Herb	CW	High
Black locust	<i>Robinia pseudoacacia</i>	Deciduous Tree	Non-native	
Himalaya blackberry	<i>Rubus discolor</i>	Perennial Vine	Non-native	High
Cut-leaved blackberry	<i>Rubus laciniatus</i>	Perennial Vine	Non-native	High
Bouncing bet	<i>Saponaria officinalis</i>	Perennial	Non-native	--
Russian thistle	<i>Salsola tragus</i>	Annual	Non-native	Limited
White horsenettle	<i>Solanum elaeagnifolium</i>	Perennial	BW	--
Johnson grass	<i>Sorghum halepense</i>	Perennial Grass	CW	--
Spanish broom	<i>Spartinum junceum</i>	Deciduous Shrub	Non-native	High
Milk thistle	<i>Silybum marianum</i>	Annual or Biennial	Non-native	--
Medusahead grass	<i>Taeniatherum caputmedusae</i>	Annual Grass	CW	High
Puncturevine	<i>Tribulus terrestris</i>	Annual Herb	Non-native	--
Gorse	<i>Ulex europaeus</i>	Thorny Shrub	BW	High
Woolly mullein	<i>Verbascum thapsus</i>	Perennial	Non-native	Limited

¹ Code Weed Status

AW A list (noxious weeds)

BW B list (noxious weeds)

CW C list (noxious weeds)

¹ Code Weed Status

NAW Noxious aquatic weed

PN Public nuisance

Q Quarantine

¹ Code Weed Status

OW O list (temporary "A" list

noxious weed, pending final

determination).

² Calweeds Database, California Invasive Plant Council website- Accessed September 2008. California weeds list status for noxious weeds, and a rating for the ecological impact of each species cal-1ps/ip/inventory/weedlist.

The Stanislaus National Forest maintains a list of noxious weeds and non-native, invasive pest plants of concern (Table 3.02-5). Inventories for weeds are conducted using this list as a guide. The list was generated from several sources including the Sierra Nevada Forest Plan Amendment (USDA 2001, p.

310-311), the list of State-rated noxious weeds (CDFG 2007), new weed discoveries in the Forest, occurrence records (CalFlora 2008), published technical references (Bossard, et.al., 2000, Hickman, 1993), and personal observations. The project record contains a detailed Noxious Weed Risk Assessment.

Noxious Weed Management

The Forest has inventoried and monitored noxious weed locations and planned or implemented a number of noxious weed treatment projects as reported in 2004 and 2005 accomplishment reports. Noxious weed infestations and invasive plant species occupy 2,622.96 acres and 29.52 miles of motorized routes. Surveys for noxious weeds are not completed for this analysis, and future monitoring and resurveying of the routes are recommended. Until surveys are performed throughout the analysis area, these numbers are considered estimates. A complete list of the proposed routes that are infested with noxious weed occurrences can be located in the Project record. In addition, a complete list of noxious weed infestations within the forest is located in the Project record.

Habitat Vulnerability and Vector Methods

Data regarding weed and non-native plant infested routes within the Stanislaus National Forest is limited. The data consists of approximately 650 routes with invasive weed infestations. This data includes data points and polygons mapped along roadsides, primarily recorded by ground-based methods. The information associated with each infested route, such as size of infestation or distance along a route, is often unknown. All data on known weed and non-native plant locations were collected by botanists during the last 10 years, documenting approximately 86 miles of weed infested NFTS roads. Although many of the existing roads within the analysis area were surveyed for weeds, not all of the proposed additions to the NFTS were surveyed. The GIS query of the existing data includes routes within 200 feet of infested areas, and weeds infestation on existing roads and proposed additions to the NFTS within 200 feet of sensitive plant occurrences/suitable habitats. Table 3.02-6 shows acres of weed species infestations on the forest.

Weeds were introduced and spread primarily through transport on vehicles, in straw and hay, on earthmoving and mowing/weed-eating equipment, and in animal manure. Weed seeds also spread quickly down stream and upwind along lakes and reservoirs.

Yellow starthistle, Tocalote or Malta starthistle and Medusahead grass are by far the most common species found along existing NFTS routes and proposed additions to the NFTS (project record). To a lesser extent, several other invasive weed species occur, primarily along roads. Yellow Starthistle (*Centaurea solstitialis*) was introduced in North America probably sometime after 1849 as a seed contaminant in Chilean-grown alfalfa seed, also known as Chilean clover. Historic records indicate that alfalfa was first introduced to Chile from Spain and from Spain to California before 1903. Yellow starthistle in California was mainly transported to other areas by the use of tractors and equipment. It began invading the foothill grasslands around the 1940's and has become a part of the grazing/weed system (Di Tomaso 2001) Human activities are the primary mechanism for long distance movement of yellow starthistle seed. It is transported in large amounts by road maintenance equipment and on the undercarriage of vehicles. It can reduce land value and reduce access to recreational areas (Di Tomaso 2007). In addition, starthistle infestations can reduce wildlife habitat and forage, displace native plants, and decrease native plant and animal diversity (Sheley and Larson 1995). Dense infestations not only displace native plants and animals, but also threaten natural ecosystems and nature reserves by fragmenting sensitive plant and animal habitat (Scott and Pratini 1995).

Most weeds will persist in permanent natural openings such as in meadows, on lava caps, and along roads. With the possible exception of blackberries, most weeds tend to be shaded out in forested areas as trees grow. Weeds are of particular concern where they alter habitats; compete with sensitive plants and other rare species, or occur near vectors (streamside, areas of high human use, fire staging and action areas, birds, etc.) that could carry them quickly to other areas.

Motor vehicle use is known to contribute to weed introduction in a number of ways (Trombulak and Frissell 2000) including moving weed seed and plant parts from place-to-place in the mud/soil on tires, and/or on the vehicle body. Motor 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 OHV trails provide habitat for any weed seed deposited. Weeds spread by motor vehicle use regardless of the season of use. Native vegetation is also known to be physically damaged by motor 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 motor vehicle use introduces weeds into new areas and the weeds become established, the vegetative pattern is changed, providing more flammable fuels into the system. As the weeds spread and increase in volume, an increase in fuels occurs. 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. It is a primary concern on lava caps where dryer areas provide competition with sensitive plants. 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.

Edges are recognized as 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.

The rate that weeds are introduced to the creation of unauthorized routes is unknown. In one study, Rooney (2003) collected mud from the undercarriage of 14 motor vehicles. He found that seeds germinated from the mud collected from 4 of those vehicles. In the same study, he reported that each vehicle carried an average of 3.6 seeds. When he multiplied this number by the number of motor vehicles traveling each day, he estimated that about 6 million seeds were transported per vehicle per year in Wisconsin. Rooney predicted that over the long term, with motor vehicles as seed dispersers, the fraction of roads/trails colonized by weeds would increase until all motorized roads and trails reached a weed saturation level. This prediction was based on the lack of constant, extensive, effective monitoring of motor vehicle routes. He also reported that weeds are generally better adapted to vehicular dispersal than native plant species due to their small seed size, high seed production, and persistent seed banks. In this analysis, 200 feet was chosen to define the distance that weed seed would be dispersed and established from travel on tires.

Disturbance by motor vehicles can have long-term effects to soils and favor weed establishment. Motor vehicles compact soils reducing water infiltration and accelerating erosion. They also displace soils and shear off vegetative roots. If these effects are severe, a loss of soil productivity may occur. 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 and trails 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. Appendix F contains a complete summary of maintenance definitions.

Another aspect of motor vehicle use that helps to spread weeds is tied to the use of recreational areas and facilities, such as trailheads, campgrounds, staging areas, and dispersed camping access areas. These areas are frequently the first site on NFS lands that the motor vehicle comes in contact with after leaving major highways. Therefore, they frequently receive weed seed and plant parts. These areas have constant soil disturbance that provide a good seedbed for any weed seed that is deposited. In addition, the visitors themselves 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 were disturbed, such as eroding stream banks, road and trail crossings, and undeveloped trails. In addition, 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. Surveys for this listed noxious weed are incomplete, and it is not located with in the analysis area.

Sensitive plants and watchlist species occurrences located in and/or near motor vehicle roads and trails have a high risk of negative impacts from weed introduction and spread. Several of the known occurrences of weeds directly and indirectly impact sensitive plant occurrences. Noxious weed infestations, such as yellow starthistle and Klamath weed, are present along the Bull Creek Road on the Groveland District, and several of the known occurrences and habitat of the sensitive species *Clarkia australis* are directly and indirectly impacted. These occurrences are in open habitat and cutbanks where off-trail use can easily occur, and noxious weed spread is a primary concern for high risk to habitat and plants. Table 3.02-7 displays the miles of routes infested with invasive weeds. Table 3.02-8 displays routes where sensitive/watchlist plants and/or plant communities were impacted with noxious weed infestations. These plants and communities 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 200 feet are at even greater risk of negative impacts from weed infestation. This mileage does not represent a total inventory of weeds; it does include the routes with the most extensive roadside infestations on routes.

While noxious weeds and other invasive plant species may cause direct or indirect effects to sensitive plants through competition, weeds have major effects on potentially sensitive habitats. Invasive weeds also reduce species diversity in natural habitats across the analysis area. This loss of species diversity is of high concern not only at the forest level and analysis area, but for the adjacent private, state, and county lands. At present, noxious weeds such as yellow starthistle and Klamath weed are present along right-of-ways on Bull Creek Road and other county roads in the Stanislaus National Forest. Not only are these invasive species adjacent to private property on which some of the property owners are actively engaged in weed control, but they are also present in staging areas for OHV use. "Increasing motorized vehicle/OHV traffic within the analysis area, and the entire forest, have the potential to provide an avenue for the proliferation of noxious weeds, not only in the areas where they currently exist, but also into new areas of the forest and onto adjacent private lands as well as public right-of-ways outside the forest boundaries" (Cathi Boze, Mariposa County, comment 042009-02-01).

Table 3.02-6 Weed Species Infestations

Common Name	Botanical Name	Acronym	Acres
Jointed goatgrass	<i>Aegilops cylindrica</i>	AECY	0.05
Barbed goatgrass	<i>Aegilops triuncialis</i>	AETR	0.04
Tree-of-heaven	<i>Ailanthus altissima</i>	AIAL	0.09
Cheatgrass	<i>Bromus tectorum</i>	BRTE	46.46
Italian thistle	<i>Carduus pycnocephalus</i>	CAPY	8.26
Diffuse knapweed	<i>Centaurea diffusa</i>	CEDI	2.10
Tocalote/Malta starthistle	<i>Centaurea melitensis</i>	CEME	150.10
Yellow starthistle	<i>Centaurea solstitialis</i>	CESO	2,177.51
Squarrose knapweed	<i>Centaurea virgata ssp. squarrosa</i>	CEVIS	0.51
Canada thistle	<i>Cirsium arvense</i>	CIAR	0.25
Bull thistle	<i>Cirsium vulgare</i>	CIVU	33.32
Field bindweed	<i>Convolvulus arvensis</i>	COAR	0.01
Scotch broom	<i>Cytisus scoparius</i>	CYSC	2.01
French broom	<i>Genista monspessulana</i>	GEMO	0.27
Klamath weed	<i>Hypericum perforatum</i>	HYPE	42.53
Dyers woad	<i>Isatis tinctoria</i>	ISTI	0.74
Oxeye daisy	<i>Leucanthemum vulgare</i>	LEVU	0.41
Himalaya blackberry	<i>Rubus discolor</i>	RUDI	4.40
Cut-leaved blackberry	<i>Rubus laciniatus</i>	RULA	5.06
Bouncing bet	<i>Saponaria officinalis</i>	SAOF	1.08
Milk thistle	<i>Silybum marianum</i>	SIMA	0.37
Spanish broom	<i>Spartinum junceum</i>	SPJU	0.02
Medusahead grass	<i>Taeniatherum caputmedusae</i>	TACA	138.80
Puncturevine	<i>Tribulus terrestris</i>	TRTE	0.11
Woolly mullein	<i>Verbascum thapsus</i>	VETH	2.28
Total			2,622.96

The Noxious Weed Risk Assessment describes invasive plant species (project record)

Table 3.02-7 Motorized Routes Infested with Invasive Weeds

Road Maintenance Level	Alternative (miles)				
	1	2	3	4	5
ML2	16.37	24.36	24.36	21.34	16.06
ML2 + HLO	4.58	0.00	0.00	3.40	4.57
ML3 + HLO	4.91	5.16	5.16	4.94	5.16
Additions to the NFTS	0.80	0.00	0.00	4.00	0.00
Total	26.66	29.52	29.52	33.68	25.79

Table 3.02-8 Additions to the NFTS with Weeds and Direct Impacts to Sensitive Plants

Route	Sensitive Plant	Invasive Plants
15EV43C	Tuolumne fawn lily	Yellow starthistle
15EV43C	Tuolumne fawn lily	Yellow starthistle
15EV43C	Tuolumne fawn lily	Yellow starthistle
15EV43C	Tuolumne fawn lily	Milk thistle
15EV43C	Tuolumne fawn lily	Milk thistle
15EV43G	Tuolumne fawn lily	Yellow starthistle
16EV108	Stebbin's lomatium	Cheatgrass
16EV109	Stebbin's lomatium	Cheatgrass
16EV236	Stebbin's lomatium	Cheatgrass
17EV183	Parry's horkelia	Yellow starthistle
17EV192	Hetch-Hetchy monkeyflower/ Parry's horkelia	Yellow starthistle
17EV192A	Hetch-Hetchy monkeyflower/ Parry's horkelia	Yellow starthistle
17EV231	Three-bracted onion/ Stebbin's lomatium	Tree of heaven
17EV78	Stebbin's lomatium	Cheatgrass
17EV88	Three-bracted onion/ Stebbin's lomatium	Cheatgrass
18EV110	Kellogg's lewisia/ Stebbin's lomatium	Cheatgrass
FR98581	Mariposa clarkia	Yellow starthistle

SPECIAL INTEREST AREAS

The management emphasis for Special Interest Areas (SIA) is to protect and manage unique geological, scenic, historical, archaeological, botanical and memorial features, and to preserve the

integrity of the special interest feature for which the area was established. A wide range of resource activities is permitted, provided the unique features of each area are protected (see Chapter 3.05, Roadless and Special Areas). The two SIAs contain sensitive species and Botanical resources.

Trumbull Peak Historic and Botanic Area: The entire area covers 150 acres and includes three occurrences of sensitive plants, including Yosemite onion (*Allium yosemitense*), Congdon's woolly sunflower (*Eriophyllum congdonii*), and Congdon's lewisia (*Lewisia congdonii*). The existing road access to the area is gated with permitted access only.

Pacific Madrone Botanic Area: This 15 acre area contains the two southernmost known groves of Pacific Madrone (*Arbutus menziesii*) growing 1/10 mile apart. The two groves contain 20 mature and sapling trees, and some seedlings surrounded by riparian vegetation. No known occurrences of sensitive plants and no proposed additions to the NFTS in this area.

RESEARCH NATURAL AREAS

Certain botanical resources are protected within four Research Natural Areas (see Chapter 3.05, Roadless and Special Areas).

Bell Meadow Research Natural Area (490 acres): designated for aspen research, the RNA is located in the east-central portion of the Forest. It contains 110 acres of aspen stands in Bell Meadow along with wet mountain meadow, riparian habitat and examples of the aspen-meadow complex on deep soils.

Critchfield (Bourland Meadow) Research Natural Area (1,003 acres): designated for bogs and meadow research the RNA is located in the east-central portion of the Forest adjacent to the Emigrant Wilderness. Vegetation consists of seven major associations: red fir, red fir-lodgepole pine, red fir-western white pine-lodgepole pine, red fir-white fir-Jeffrey pine, red fir-white fir, and red fir-aspen. Wet and dry meadows are present and the area is noted for aquatic bog values. Successional stages are present in several stands, including meadows.

Grizzly Mountain Research Natural Area (500 acres): designated for black oak research, the RNA is located in the southern portion of the Forests on the northern slopes of Little Grizzly and Big Grizzly Mountains. Black oak stands occupy most of the area, interspersed with brush and scattered ponderosa pine.

Clark Fork Candidate Research Natural Area (460 acres): designated for white fir research, the RNA is located in the northeast portion of the Forest near Clark Fork Campground. It includes various mixtures of white fir and other conifers at a range of elevations. Part of the area (250 acres) is within the Bald Peak proposed addition to the Carson-Iceberg Wilderness and the remainder is within the Clark Fork proposed Wild and Scenic River.

Environmental Consequences

People, vehicles and the roads they travel on tend to diminish and fragment suitable habitat for certain Sensitive species. The Stanislaus National Forest has about 2,947 miles of NFTS roads. Most areas have adequate road access. Small areas are still identified where minor amounts of new road construction are needed. In addition to the system roads, a number of unauthorized routes exist. Unauthorized roads originate in different ways. Some are built as temporary roads, often for timber access. Some are user-created routes made by OHV use. The entire forest is not completely surveyed for unauthorized routes. The Stanislaus is in a gradual process of inventorying the unauthorized roads, and approximately half of the Forest is inventoried (see Chapter 3.08, Transportation). In some areas of the Forest, new routes continue to be developed by people driving their vehicles off existing roads. After one vehicle leaves a set of wheel tracks, other vehicles follow, creating an unauthorized route.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

1. Cross Country Travel

Cross-Country travel is prohibited in Alternative 1. Elimination of cross country travel reduces impacts to plant communities by reducing direct impacts of crushing, ground disturbance, sedimentation, and rutting. Fewer acres are disturbed, resulting in fewer weed infestations. Passive recovery would occur on routes not added to the system. Sensitive plant populations could be affected by other non-motorized uses on these routes.

2. Additions to the NFTS

Alternative 1 includes 151.64 miles of proposed additions to the NFTS. These additions would likely increase the direct and indirect effects to sensitive plants and their habitats. Proliferation of unauthorized routes is assumed zero or minor. The significance of direct and indirect 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. Three routes will be mitigated for direct and indirect effects to plants and habitat in Alternative 1.

The unauthorized routes will be allowed to passively recover. Passive recovery and re-vegetation is expected within a 10 year period. Disturbed areas on shallow soils, particularly above 8,000 feet elevation (cold temperature), will recover more slowly. These changes will have a positive effect on soil conditions as compared to Alternative 2 (see Chapter 3.07, Soil Resource). With less disturbance from motor vehicles direct impacts would be lessened. Competing vegetation as a result of passive recovery may have an indirect effect to sensitive plants and habitat.

3. Changes to the Existing NFTS

Vehicle Class

Vehicle class changes would occur on 616.80 miles of NFTS roads. It is assumed that changing vehicle class does not change impacts to sensitive species and watchlist plants/plant communities, and that effects from all types of motor vehicles are assumed equal. These roads already have hardened surfaces that lack vegetation. It is likely that direct impacts to sensitive species and watchlist 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 200 feet of the road. These indirect impacts would continue regardless of the type of vehicle using the road.

Season of Use

Alternative 1 provides for season of use on designated native NFTS motorized routes (see Chapter 2). Lower elevations are open all year, middle elevations are open April 1 through November 30, and upper elevations are open May 15 through November 30. Alternative 1 has a longer closure time and more benefit with lesser impact on sensitive plant resources than Alternative 4 and more of an impact than Alternative 5. Wheeled over snow use would be allowed on 105.92 miles of roads by ATVs when 12 inches or more of snow is present (see Table 2.02-2) with no anticipated impact to plant communities by allowing this use.

Indicator Measure 1 – Number of sensitive plant sites/ occurrences within 200 feet of motor vehicle routes

Under Alternative 1, potential exists for direct and indirect effects to 83 documented sensitive plant sites and suitable habitat areas. These 83 sensitive plant sites and suitable habitat areas are documented to be within 200 feet of the 151.64 miles of proposed additions to the NFTS under

Alternative 1. Based on the assumption that suitable habitat exist along routes in upland and mid slope habitats and lower montane, chaparral, and woodland habitats, fourteen sensitive plant species may be directly or indirectly affected by routes within 200 feet of suitable habitat. These include: Jepson's onion, Yosemite onion, Nissenan manzanita, big-scale balsamroot, Pleasant Valley mariposa lily, Small's southern clarkia, Merced clarkia, Tahoe draba, Congdon's woolly sunflower, Parry's horkelia, short-leaved hulsea, Tuolumne fawn lily, Yosemite lewisia, and slender-stalked monkeyflower.

Indicator Measure 2 - Number of documented direct impacts to sensitive plant sites/occurrences on either side of route's edge within 30 feet of motor vehicle routes

Alternative 1 contains 159 documented sensitive plant sites with known impacts from motor vehicle use, including driving off-road for parking or dispersed camping access. The Biological Evaluation (BE) for Sensitive Plants and Other Botanical Resources shows routes with direct impacts to plants for this alternative (project record). Table 3.02-9 shows the number of potentially affected occurrences for each sensitive plant species along motor vehicle routes included in Alternative 1.

Table 3.02-9 Species and Occurrences within 30 feet of Motor Vehicle Routes: Alternative 1

Species Name	Occurrences
Kellogg's lewisia	3
Mariposa clarkia;	2
Small's southern clarkia	7
Tuolumne fawn lily	3
Hetch-Hetchy (slender-stemmed) monkeyflower	9
three-bracted onion	4
Stebbins's lomatium	26
Parry's horkelia	5

Indicator Measure 3 - Miles of motorized routes passing through lava caps

This alternative includes 29.3 miles of proposed additions to the NFTS within lava caps with sensitive plant sites and suitable habitat areas. Three known sensitive plant species may be directly or indirectly affected by proposed additions to the NFTS in lava cap habitat areas. These sensitive plant sites occur within 200 feet of proposed additions to the NFTS within lava cap areas: Stebbin's lomatium, three-bracted onion, and Kellogg's lewisia. The three-bracted onion (*Allium tribracteatum*) is an endemic occurring on very thin soils in open habitat and is quite vulnerable to OHV activity. This species would be most vulnerable by opening the trails within this habitat in early April (M. Willits, personal communication, January 16, 2009).

Indicator Measure 4 - Miles of motorized routes passing through meadows

Approximately 1.8 miles of proposed additions to the NFTS pass through meadows with the potential to affect several sensitive plant species and mosses. Based on the assumption that suitable habitat exist along routes in meadows and riparian areas, seventeen sensitive species, including six mosses, one lichen, five moonworts, Tuolumne fawn lily, Hetch-Hetchy monkeyflower, subalpine fireweed, pansy monkeyflower, and Pilot Ridge fawn lily may be directly/indirectly affected by routes open for public motorized vehicle use through wet areas. Of the action alternatives, Alternatives 1 and 4 have the greatest number of proposed additions affecting sensitive plants in moist habitats.

Indicator Measure 5 - Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat

This alternative includes 0.80 miles of proposed additions to the NFTS infested with invasive plant species and the potential to indirectly affect sensitive plant sites and suitable habitat areas. Twenty nine known noxious weed and invasive plant infestations are within 200 feet of sensitive plant sites and suitable habitat areas. Under this alternative, 22 sensitive plant sites/suitable habitat areas are within 200 feet of weed infested proposed additions to the NFTS. The two sensitive plant species with

the highest number of sites with potential indirect and direct effects from noxious and invasive weed infestations include the Tuolumne fawn lily and Stebbin's lomatium. Stebbin's lomatium has 7 sites within 200 feet of noxious weed infestations, and Tuolumne fawn lily has 6 sites within 200 feet of noxious and invasive weed infestations associated with proposed additions to the NFTS. An additional 9 sensitive plant sites may be indirectly or directly affected by noxious and invasive weed infested routes under this alternative.

CUMULATIVE EFFECTS

Alternative 1 will potentially have the third highest impact to sensitive plant sites and suitable habitat areas after alternative 4 and 2. The Tuolumne fawn lily, an endemic to the Stanislaus National Forest, has documented impacts from numerous recreational and other forest uses. Existing impacts by OHV in suitable habitat areas for this plant species were extensively documented. The three sensitive plant sites of Tuolumne fawn lily that may be impacted by proposed additions to the NFTS under Alternative 1 represent approximately 7% of the total known sensitive plant sites for this species in the analysis area. Stebbin's lomatium, another endemic to the Stanislaus National Forest, has documented impacts from OHV and other recreational uses. Under this alternative, proposed additions to the NFTS and increases in OHV use will likely increase the cumulative effects to both of these plant species over time. It is assumed that future OHV use will contribute to the adverse cumulative effects, but would not result in reducing the viability of this species. A second vulnerable species, Hetch-Hetchy monkeyflower, has approximately 204 known sites documented on the Stanislaus National Forest. This species has a fairly narrow range, distributed through the southern half of the Groveland Ranger District. Nine of the 204 sites have documented impacts from motor vehicles on the analysis area. The meadows and seeps where this species occurs are easily accessed by OHVs. Numerous types of projects impact this species and were documented including, OHV use, logging, Ackerson and Rogge wildfires, large fire salvage, and reforestation projects. The nine plant sites potentially impacted by Alternative 1 represent approximately 4% of the total known sites for this species within the analysis area.

Parry's horkelia occurs in open habitat where users have created unauthorized cross country OHV trails and some of these trails pass through known sites. Documented sites exist near a fuel break in the Date Flat area. Noxious and invasive weeds spread by OHV use threaten this species. The five sites that may be impacted under Alternative 1 represent approximately 4% of the total known plant sites.

Other meadow-dwelling sensitive species include moonworts, hump-mosses, Bolander's bruchia, and Blandow's bog moss. Although these are wide ranging species, none are known numerous in California, and some of these species are in decline throughout their historic ranges. It is assumed that forest projects have and will impact the suitable habitat. Surveys for these meadow-dwelling sensitive species are incomplete within the analysis area. However, it is not likely that the cumulative effects of these projects (see Appendix B) will result in reducing the viability of these species.

This alternative includes noxious and invasive weed infestations associated with 26.66 miles along the entire NFTS. Only 0.80 miles are associated with additions to the NFTS. Overall, adverse cumulative effects to sensitive plant species under Alternative 1 are not expected to be of the scale that would reduce species viability for any of the Stanislaus National Forest sensitive plant species. Implementation of Alternative 1 would not, over time, improve conditions for sensitive plants and their habitats as a result of continued public motorized vehicle use. Impacts to sensitive plant sites and suitable habitat areas by motorized uses are taking place and are expected to increase in the foreseeable future due to the predicted increase in motor vehicle use. Monitoring of sensitive plant sites and any needed mitigations be implemented where impacts from off-road vehicles use is documented.

While direct effects to sensitive plant species from disturbances caused by these activities was minimally mitigated by avoidance, indirect effects such as further invasion by noxious weeds occurred. Given the magnitude of the disturbance involved in various activities during the past 150 years, it is likely that historic fire suppression, road and trail construction (designed and unauthorized routes), campground construction, other types of recreation activities including OHV use, timber management, salvage activities, reforestation practices, historic grazing and mining activities, and hydroelectric development have degraded suitable habitat. It is also likely that individual sensitive plants were destroyed by these activities and that entire occurrences may have been eliminated.

For the purpose of this analysis, cumulative effects of past activities are represented within the existing conditions. Appendix B provides a list and description of past, present, and reasonably foreseeable projects, including private lands within the Forest boundary. Some, but not all, of these present and future activities will contribute to effects on sensitive plant and habitat. Within the project area, hazardous fuels reduction and associated timber harvest have occurred on approximately 25,410 acres of NFS land since 2000 (see Appendix B). These treatments are the primary activity that will alter forest vegetation and impact sensitive plants and habitat. These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Since 2000, approximately 85,000 acres of NFS lands burned in wildfires. Within the project area, prescribed burning occurred on about 22,500 acres between 2000 and 2008. CDF lists a total of 2,365 acres of private land within the Stanislaus National Forest administrative boundary for which timber harvest plans were submitted. On private timberlands, harvest methods include selective thinning and regeneration (clearcut) and then are reforested using herbicides to suppress competing vegetation.

Compliance and maintenance efforts may limit the extent of impacts to the more vulnerable sensitive plant habitat areas. Difficult access to suitable habitat areas and sensitive plant occurrence areas, as well as prohibiting cross country travel on unauthorized routes will alleviate impacts from motor vehicles in some areas of the forest. Under Alternative 1, cumulative impacts to sensitive plants are expected to remain below the threshold that reduces the overall viability for these rare plant species, or to cause listing under the Endangered Species Act.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

1. Cross Country Travel

Cross-country travel would not be prohibited under this alternative and travel on all existing routes would continue except where prohibited by existing Forest Orders. It is assumed that route proliferation would continue over the short and long-term. Passive recovery would not occur as the routes would continue to be used. The use of these routes and the continued proliferation of new routes would result in increasing amounts of disturbance to sensitive plants and their habitat. Route proliferation would continue at an estimated 2 miles per year. The effect of this route proliferation is unknown because the proliferation can occur anywhere on the landscape. It can be expected that sensitive plant habitat would be affected and an increased introduction of noxious weeds would occur.

2. Additions to the NFTS

No additions are being proposed to the system.

3. Changes to the Existing NFTS

Vehicle Class

No changes are made to vehicle class.

Season of Use

No changes are made to existing restrictions (see Table 2.02-7). Wheeled over snow activities would continue. Alternative 2 has potential direct and indirect effects to approximately 39 percent of all documented sensitive plant sensitive plant sites/ occurrences and suitable habitat areas within 200 feet of unauthorized routes for the analysis area. Alternative 2 has 11.16 miles of unauthorized routes within meadows, and 29.52 miles of weed infested routes. Wheeled over snow use has potential direct and indirect impacts to sensitive plant habitat. The potential impacts of these routes to the sensitive plants and habitat are included in the analysis in Indicator Measure 1 of this alternative for the upland and midslope species and habitat. Indirect effects of wheeled over snow travel to plant species and habitat would most likely be a result secondary to rutting or change in hydrology.

Indicator Measure 1 - Number of sensitive plant sites/ occurrences within 200 feet of motor vehicle routes

Direct and indirect effects may occur to 612 sensitive plants sites/habitat areas located within 200 feet of 2,259.37 miles of motor vehicle routes. Based on the assumption that suitable habitat exist along routes in upland and mid slope habitats and lower montane, chaparral, and woodland habitats, fourteen sensitive plant species may be directly or indirectly affected by routes within 200 feet of suitable habitat. These include: Jepson’s onion, Yosemite onion, Nissenan manzanita, big-scale balsamroot, Pleasant Valley mariposa lily, Small’s southern clarkia, Merced clarkia, Tahoe draba, Congdon’s woolly sunflower, Parry’s horkelia, short-leaved hulsea, Tuolumne fawn lily, Yosemite lewisia, and slender-stalked monkeyflower.

Indicator Measure 2 - Number of documented direct impacts to sensitive plant sites/occurrences on either side of route’s edge within 30 feet of motor vehicle routes

Alternative 2 contains 248 documented sensitive plant sites with known impacts from motor vehicle use, including driving off-road for parking or dispersed camping access. The BE for Sensitive Plants and Other Botanical Resources shows routes with direct impacts to plants for this alternative (project record). Table 3.02-10 shows the number of potentially affected occurrences for each sensitive plant species along motor vehicle routes included in Alternative 2.

Table 3.02-10 Species and Occurrences within 30 feet of Motor Vehicle Routes: Alternative 2

Species Name	Occurrences
Kellogg’s lewisia	3
Mariposa clarkia	25
Small’s southern clarkia	45
Tuolumne fawn lily	28
pansy monkey flower	15
Hetch-Hetchy (slender-stemmed) monkeyflower	5
three-bracted onion	18
Stebbins’s lomatium	68
mountain lady slipper	4
Bolander’s bruchia	4
Tuolumne fawn lily	2
veiny aquatic lichen	2
Yosemite woolly sunflower	3
Parry’s horkelia	19

Indicator Measure 3 - Miles of motorized routes passing through lava caps

Approximately 65.97 miles of existing motorized routes within lava caps have sensitive plant sites and potential habitat for three sensitive species, including Stebbin’s lomatium, three-bracted onion, and Kellogg’s lewisia. The three-bracted onion (*Allium tribracteatum*) is an endemic occurring on very thin soils in open habitat and is quite vulnerable to OHV activity. Of the species most affected by OHV activity, the three-bracted onion and Stebbin’s lomatium have the most impacts.

The Tuolumne Fawn lily (*Erythronium tuolumnense*) has 28 known occurrences with impacts due to proximity of OHV routes. If Alternative 2 is chosen as the preferred alternative, the risk to the viability of this species is high. The Interim Management Guide for this species identifies soil compaction and soil movement as the greatest threats because these effects reduce the vigor of the individuals and reduce the numbers of individuals within the population.

The pansy monkey flower (*Mimulus pulchellus*) has 15 known occurrences that are directly impacted by this alternative. The habitat for this species, primarily moist areas on lava caps, is receiving potentially detrimental impacts from off road use. Accesses to these areas are from existing routes and vehicles have created ruts in these wet areas. As a consequence, drainage from the rutting has caused, in some cases, complete destruction of the habitat.

Indicator Measure 4 - Miles of motorized routes passing through meadows

Approximately 11.16 miles of routes pass through meadows under this alternative. Based on the assumption that suitable habitat exist along routes in meadows and riparian areas, seventeen sensitive species, including six mosses, one lichen, five moonworts, Tuolumne fawn lily, Hetch-Hetchy monkeyflower, subalpine fireweed, pansy monkeyflower, and Pilot Ridge fawn lily may be directly/indirectly affected by routes open for public motorized vehicle use through wet areas.

Indicator Measure 5 - Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat

At present, 29.52 miles and 521 motorized routes are infested with noxious and invasive weed species which potentially affect sensitive plant sites and/or suitable habitat areas. Thirty two known noxious and invasive weed infestations are within 200 feet of sensitive plant occurrences and suitable habitat areas. Under this alternative, 41 sensitive plant sites and suitable habitat areas are directly or indirectly affected by routes with noxious and invasive weed infestations within 200 feet.

CUMULATIVE EFFECTS

Although adverse cumulative effects to sensitive plant species under Alternative 2 are not expected to be of the scale that would reduce species viability, nearly 40 percent of the total number of known sensitive plant sites/ occurrences and suitable habitats throughout the Stanislaus National Forest are impacted by motor vehicle use. Current impacts by motor vehicle travel are not extensively documented in all suitable habitat areas for sensitive plant species. Alternative 2 potentially affects approximately 39 percent of all Stanislaus National Forest documented sensitive plant sites and their habitats within the analysis. Alternative 2 has the greatest number of miles within meadows and lava caps. Under Alternative 2, cumulative effects from implementing a variety of projects listed in Appendix B could impact sensitive plants and their habitat, especially in meadows and on lava caps.

Alternative 2 would not, over time, improve conditions for sensitive plants and their habitats as a result of continued public motorized vehicle use on unauthorized routes and cross country travel. Impacts to sensitive plant occurrences and habitat are expected to increase in the foreseeable future due to the predicted increase in population and associated increased motor vehicle use. In Alternative 2, cumulative impacts to sensitive plants are expected to remain below the threshold required to reduce the overall viability or cause listing status for these rare plant species. The unknown effects to sensitive plants and their habitat is greater under this alternative as motor vehicle travel by the public would not be limited to NFTS routes and continued use of user created routes is more likely to occur. It is assumed present and future unmanaged OHV use will contribute to the adverse cumulative effects. The continued use of the existing routes will negatively affect the viability of sensitive plant species and habitat. The significance of direct and indirect 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 individuals of sensitive species that occur in a specific location and how many of them are damaged.

Alternative 2 reflects the greatest number of miles of invasive plant infestations within 200 feet of sensitive plant resources and the risk of weed vectoring by motor vehicles is greater than all of the other alternatives. Over time, this alternative may have the highest level of cumulative effects to sensitive plant resources caused by noxious and invasive plant infestations.

This alternative would have the greatest impacts to sensitive plant communities in comparison to all of the other alternatives, with direct and indirect effects to approximately 612 known sites/suitable habitat areas within 200 feet of the 2259.37 miles of routes open for public motorized vehicle use. At this time it is unknown what the direct and indirect effects are to undocumented plant occurrences. The unknown effects to sensitive plants and their habitat is greater for this alternative as motor vehicle travel by the public would not be limited to NFTS routes and continued use of user created routes will occur. Because of the inability to predict where route proliferation would occur on the Forest, it is difficult to determine what effects route proliferation has on suitable habitat. While direct effects to sensitive plant species from disturbances caused by these activities are minimally mitigated by avoidance, indirect effects such as further invasion by noxious weeds occurred. Given the magnitude of the disturbance involved in various activities during the past 150 years, it is likely that historic fire suppression, road and trail construction (designed and unauthorized routes), campground construction, other types of recreation activities including OHV use, timber management, salvage activities, reforestation practices, historic grazing and mining activities, and hydroelectric development have degraded suitable habitat. It is also likely that individual sensitive plants were destroyed by these activities and entire occurrences eliminated.

For the purpose of this analysis, cumulative effects of past activities are represented within the existing conditions. Appendix B provides a list and description of past, present, and reasonably foreseeable projects including private lands within the Forest boundary. Some, but not all, of these activities will contribute to effects on sensitive plant and habitat. Within the project area, hazardous fuels reduction and associated timber harvest have occurred on approximately 25,410 acres of NFS land since 2000 (see Appendix B). These treatments are the primary activities that have altered forest vegetation and impacted sensitive plants and habitat. These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Since 2000, approximately 85,000 acres of NFS lands burned in wildfires. Within the project area, prescribed burning occurred on about 22,500 acres between 2000 and 2008. CDF lists a total of 2,365 acres of private land within the Stanislaus National Forest administrative boundary for which timber harvest plans were submitted. On private timberlands, harvest methods include selective thinning and regeneration (clearcut) and then are reforested using herbicides to suppress competing vegetation.

Alternative 3 (Cross Country Prohibited)

DIRECT AND INDIRECT EFFECTS

1. Cross Country Travel

Motor vehicle travel off NFTS routes by the public would be prohibited except as allowed by permit or other authorization. The routes will be allowed to passively recover. Passive recovery and re-vegetation is expected within a 10 year period. The time frame of 10 years allows for most of the routes to grow vegetation and stabilize to background erosion rates. Disturbed areas on shallow soils, particularly above 8,000 feet elevation (cold temperature), will recover more slowly. These changes will have a positive effect on soil conditions as compared to Alternative 2 (see Chapter 3.07, Soil Resource). With fewer disturbances from motor vehicles, direct impacts would lessen. Competing vegetation as a result of passive recovery may have an indirect effect to sensitive plants and their habitats.

2. Additions to the NFTS

This alternative would not result in the addition of any motorized routes to the NFTS.

3. Changes to the Existing NFTS

No changes are made to existing restrictions (see Table 2.02-7). No changes are made to the NFTS.

Indicator Measure 1 - Number of sensitive plant sites/ occurrences within 200 feet of motor vehicle routes

Because there are no additions to the system, there would be no continued effects on 410 known sites of sensitive plant populations associated with unauthorized routes. Protection would be provided to these populations by not adding these routes.

Known sensitive plant populations occur within 200 feet of the NFTS. No changes to the NFTS are proposed. These populations will continue to be monitored. At this time it is unknown what the direct and indirect effects are to undocumented plant occurrences. Based on the assumption that suitable habitat exist along routes in upland and midslope habits and lower montane, chaparral, and woodland habitats, fourteen sensitive plant species may be directly or indirectly affected by routes within 200 feet of suitable habitat. These include: Jepson's onion, Yosemite onion, Nissenan manzanita, big-scale balsamroot, Pleasant Valley mariposa lily, Small's southern clarkia, Merced clarkia, Tahoe draba, Congdon's woolly sunflower, Parry's horkelia, short-leaved hulsea, Tuolumne iris, Yosemite lewisia, and slender-stalked monkeyflower.

Indicator Measure 2 - Number of documented direct impacts to sensitive plant sites/occurrences on either side of route's edge within 30 feet of motor vehicle routes

Alternative 3 contains 155 documented sensitive plant sites with known impacts from motor vehicle use, including driving off-road for parking or dispersed camping access. The BE for Sensitive Plants and Other Botanical Resources shows routes with direct impacts to plants for this alternative (project record). Table 3.02-11 shows the number of potentially affected occurrences for each sensitive plant species along motor vehicle routes included in Alternative 3. By not adding these unauthorized routes to the system, the direct effects to these populations will be reduced.

Table 3.02-11 Species and Occurrences within 30 feet of Motor Vehicle Routes: Alternative 3

Species Name	Occurrences
Mariposa clarkia;	24
Small's southern clarkia	39
Tuolumne fawn lily	12
pansy monkey flower	10
Hetch-Hetchy (slender-stemmed) monkeyflower	14
three-bracted onion	5
Stebbins's lomatium	31
mountain lady slipper	4
Bolander's bruchia	1
Tuolumne fawn lily	1
veiny aquatic lichen	1
Yosemite woolly sunflower	3
Parry's horkelia	10

Indicator Measure 3 - Miles of motorized routes passing through lava caps

Approximately 65.97 miles of unauthorized routes are on lava caps and within 200 feet of sensitive plant sites and/or potential habitat. Three sensitive plant species, including Stebbin's lomatium, three-bracted onion, and Kellogg's lewisia grow in the lava cap habitat. The three-bracted onion (*Allium tribracteatum*) is an endemic occurring on very thin soils in open habitat and is quite vulnerable to OHV activity. These unauthorized routes will not be added to the system. Because of this, effects to lava cap associated sensitive plants will be significantly reduced.

Indicator Measure 4 - Miles of motorized routes passing through meadows

Approximately 11.16 miles of existing NFTS routes pass through meadows under this alternative. Based on the assumption that suitable habitat exist along routes in meadows and riparian areas, seventeen sensitive species, including six mosses, one lichen, five moonworts, Tuolumne fawn lily, Hetch-Hetchy monkeyflower, subalpine fireweed, pansy monkeyflower, and Pilot Ridge fawn lily may be directly/indirectly affected by routes open for public motorized vehicle use through wet areas. No changes to the existing NFTS are proposed and these routes will continue to pass through meadows.

Indicator Measure 5 - Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat

The analysis area contains 29.52 miles and 440 motorized routes infested with invasive plant species and the potential to directly and/or indirectly affect sensitive plant sites and/or suitable habitat areas. Thirty two known noxious and invasive weed infestations are within 200 feet of sensitive plant occurrences and suitable habitat areas documented for the existing routes. In the analysis area, 41 sensitive plant sites and suitable habitat areas may be directly or indirectly affected by routes with noxious and invasive weed infestations within 200 feet. This alternative would reduce the continued introduction of weeds from OHVs on 2.47 miles of unauthorized routes by not adding any routes to the NFTS. No other changes are being proposed in this alternative. The weed infestations associated with the remaining roads will continue to be monitored and aggressively treated.

CUMULATIVE EFFECTS

Under Alternative 3, cumulative impacts to sensitive plants are expected to remain below the threshold in reducing the overall viability for these rare plant species. Overall, adverse cumulative effects to sensitive plant species in Alternative 3 are not expected to be of the scale that would reduce species viability. Impacts by motor vehicle travel are not extensively documented in all suitable habitat areas for these sensitive plant species. Continued use on the NFTS will likely continue the level of effects to all of the sensitive plant species within 200 feet of the NFTS over time. At this time, it is assumed that the cumulative effects, present and foreseeable future management activities, including those from motor vehicle impacts, would not result in a trend toward federal listing for sensitive plants suspected or known to occur within the analysis area.

Sensitive plant populations exist through the analysis area. Some are directly associated with the NF transportation system. Continued motorized use on the NFTS could result in negative effects to these plant populations through increased use and parking off road.

Given the magnitude of the disturbance involved in various activities during the past 150 years, it is likely that historic fire suppression, road and trail construction (designed and unauthorized routes), campground construction, other types of recreation activities including OHV use, timber management, salvage activities, reforestation practices, historic grazing and mining activities, and hydroelectric development have degraded suitable habitat. It is also likely that individual sensitive plants were destroyed by these activities and entire occurrences eliminated. While direct effects to sensitive plant species from disturbances caused by these activities are minimally mitigated by avoidance, indirect effects such as further invasion by noxious weeds occurred.

For the purpose of this analysis, cumulative effects of past activities are represented within the existing conditions. Appendix B provides a list and description of past, present, and reasonably foreseeable projects, including private lands, within the Forest boundary. Some, but not all, of these activities will contribute to effects on sensitive plant and habitat. Within the project area, hazardous fuels reduction and associated timber harvest have occurred on approximately 25,410 acres of NFS land since 2000 (see Appendix B). These treatments are the primary activity that will possibly alter forest vegetation and impact sensitive plants and habitat. These projects will likely occur on an

estimated 3,500 acres per year, based upon the acreage treated in 2006. Since 2000, approximately 85,000 acres of NFS lands burned in wildfires. Within the project area, prescribed burning occurred on about 22,500 acres between 2000 and 2008. CDF lists a total of 2,365 acres of private land within the Stanislaus National Forest administrative boundary for which timber harvest plans were submitted. On private timberlands, harvest methods include selective thinning and regeneration (clearcut) and then are reforested using herbicides to suppress competing vegetation.

Implementation of Alternative 3 would improve conditions for sensitive plants and their habitats in comparison to the other alternatives by eliminating cross country routes, and by not adding any new routes or facilities. Impacts to sensitive plant occurrences and habitats are taking place and are expected to increase in the foreseeable future due to the predicted increase in motor vehicle use. This alternative potentially results in the least amount of impacts and effects on sensitive plant occurrences and suitable habitat areas.

Alternative 4 (Recreation)

DIRECT AND INDIRECT EFFECTS

1. Cross Country Travel

Cross-Country travel is prohibited in Alternative 4. The routes will be allowed to passively recover. Passive recovery and re-vegetation is expected within a 10 year period. Disturbed areas on shallow soils, particularly above 8,000 feet elevation (cold temperature), will recover more slowly. These changes will have a positive effect on soil conditions as compared to the Alternative 2 (see 3.07 Soil). With fewer disturbances from motor vehicles, direct impacts would lessen. Competing vegetation as a result of passive recovery may have an indirect effect to sensitive plants and habitat.

The significance of direct and indirect 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 plant individuals that occur in a specific location and how many of them are damaged.

2. Additions to the NFTS

This alternative adds 175.97 miles of unauthorized routes to the NFTS system, including 102 routes within 200 feet of known sensitive plant sites and/or suitable habitat areas. This alternative will have the greatest impact to sensitive plant communities of all of the action alternatives, with potential direct and indirect effects to approximately 123 known sensitive plant sites and suitable habitat areas within 200 feet of proposed additions to the NFTS within the analysis area. Proliferation of unauthorized routes is assumed zero or minor. Use will be discontinued on 65 miles of unauthorized routes

3. Changes to the Existing NFTS

Vehicle Class

Vehicle class changes would occur on 367.94 miles of NFTS roads. It is assumed that changing the class of vehicle does not change impacts to sensitive species and watchlist plants/plant communities and that effects from all types of motor vehicles are assumed equal. These roads already have hardened surfaces that lack vegetation. It is likely that direct impacts to sensitive species and watchlist 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 200 feet of the road. These indirect impacts would continue regardless of the type of vehicle using the road.

Season of Use

Alternative 4 provides for season of use on designated NFTS motorized routes. Season of use varies by surface type and route location within 3 different zones. Lower elevations are open all year, middle elevations are open April 1 through December 31, and upper elevations are open April 1 through December 31. The length of time for season of use increases the potential for direct and indirect effects to sensitive plant and other botanical resources under this alternative, in comparison to Alternatives 1 and 5. Wheeled over snow use is the same as Alternative 1.

Indicator Measure 1 - Number of sensitive plant sites/ occurrences within 200 feet of motor vehicle routes

Alternative 4 proposes adding 175.97 miles to the NFTS, potentially affecting sensitive plant sites and/or suitable habitat areas. At this time it is unknown what the direct and indirect effects are to undocumented plant occurrences. This alternative has potential to have the greatest impact on sensitive plant species and suitable habitat areas. 123 sensitive plant sites and habitat areas within 200 feet of routes may be affected under Alternative 4. Based on the assumption that suitable habitat exist along routes in upland and mid slope habitats and lower montane, chaparral, and woodland habitats, fourteen sensitive plant species may be directly or indirectly affected by routes within 200 feet of suitable habitat. These include: Jepson's onion, Yosemite onion, Nissenan manzanita, big-scale balsamroot, Pleasant Valley mariposa lily, Small's southern clarkia, Merced clarkia, Tahoe draba, Congdon's woolly sunflower, Parry's horkelia, short-leaved hulsea, Tuolumne iris, Yosemite lewisia, and slender-stalked monkeyflower.

Indicator Measure 2 - Number of documented direct impacts to sensitive plant sites/occurrences on either side of route's edge within 30 feet of motor vehicle routes

Alternative 4 contains 72 documented sensitive plant sites with known impacts from motor vehicle use, including driving off-road for parking or dispersed camping access. The BE for Sensitive Plants and Other Botanical Resources shows routes with direct impacts to plants for this alternative (project record). Table 3.02-12 shows the number of potentially affected occurrences for each sensitive plant species along motor vehicle routes included in Alternative 4.

Table 3.02-12 Species and Occurrences within 30 feet of Motor Vehicle Routes: Alternative 4

Species Name	Occurrences
Kellogg's lewisia	4
Mariposa clarkia;	2
Small's southern clarkia	9
Tuolumne fawn lily	4
Hetch-Hetchy (slender-stemmed) monkeyflower	11
three-bracted onion	5
Stebbins's lomatium	30
Parry's horkelia	6

Indicator Measure 3 - Miles of motorized routes passing through lava caps

An additional 32.1 miles of motorized routes within lava caps habitat areas have documented sensitive plant sites and suitable habitat. Alternative 4 has the greatest number of routes (a total of approximately 128 routes in lava cap habitat areas, and the largest potential for affects to the three sensitive plant species found growing on lava caps, including Stebbin's lomatium, Kellogg's lewisia, and three-bracted onion. The three-bracted onion (*Allium tribracteatum*) is an endemic occurring on very thin soils in open habitat and is quite vulnerable to OHV activity. This species would be most vulnerable by opening the trails within this habitat in early April (M. Willits, personal communication, January 16, 2009).

Indicator Measure 4 - Miles of motorized routes passing through meadows

This alternative includes 2.1 miles of proposed additions to the NFTS in meadows and riparian areas. Based on the assumption that suitable habitat exist along routes in meadows and riparian areas, seventeen sensitive species, including six mosses, one lichen, five moonworts, Tuolumne fawn lily, Hetch-Hetchy monkeyflower, subalpine fireweed, pansy monkeyflower, and Pilot Ridge fawn lily may be directly/indirectly affected by routes open for public motorized vehicle use through wet areas.

Indicator Measure 5 - Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat

Under this alternative, 4 miles and 68 proposed additions to the NFTS are infested with invasive plant species with the potential to affect sensitive plant sites and suitable habitat areas. Forty two known noxious weed infestations are within 200 feet of sensitive plant sites and suitable habitat areas documented for the proposed additions to the NFTS under Alternative 4. Under this alternative, a total of 17 sensitive plant sites/suitable habitat areas are within 200 feet of noxious weed infestations on proposed additions to the NFTS, and 32 sites on existing routes. The two sensitive plant species with the highest number of occurrences with potential direct and indirect effects from noxious weed infestations include the Tuolumne fawn lily and Stebbin's lomatium. Stebbin's lomatium has 6 sites within 200 feet of noxious weed infestations, and Tuolumne fawn lily has 5 sites within 200 feet of noxious weed infestations.

CUMULATIVE EFFECTS

Overall, adverse cumulative effects to sensitive plant species from Alternative 4 may or may not be of the scale that could reduce species viability for two of the most potentially affected species, including the Tuolumne fawn lily and Stebbin's lomatium. Stebbin's lomatium grows in lava cap habitat areas, which tend to have the highest number of routes affecting rare plant resources. At least 8 percent of the known sites of Stebbin's lomatium and approximately 10 percent of the known sites of Tuolumne fawn lily are likely to be adversely affected by motor vehicle use from the proposed additions to the NFTS under this alternative. It is unlikely that the cumulative effects of present, and foreseeable future management activities, including those from motor vehicle impacts, would result in a trend toward federal listing for Tuolumne fawn lily (CNPS list 1B.2) and Stebbin's lomatium (CNPS list 1B.1).

Kellogg's lewisia has 10 sites documented in the analysis area. Three sites have documented direct impacts from motor vehicle uses on existing motorized routes. In addition, four sites of this plant species may be directly impacted by proposed additions to the NFTS under Alternative 4. A total of 70% of the known sensitive plant sites may be directly affected by motorized travel under this alternative. Due to the extended range of this taxon within the Sierra Nevada and the fact that this taxon was only recently listed as sensitive, possible impacts may occur through the range. More information from neighboring forest would be useful regarding the impacts from OHV vehicles, and possible trend towards a federal listing. It is determined that the cumulative effects in the analysis area from present and foreseeable future management activities would not likely result in a trend toward federal listing for Kellogg's lewisia (CNPS list 3), however, the occurrences on the Stanislaus National Forest will be highly impacted by the proposed routes.

Alternative 4 has the greatest number of proposed additions to the NFTS in lava caps of all the action alternatives. Stebbin's lomatium and Kellogg's lewisia grow in lava cap habitat areas where the highest densities of motorized routes occur in the analysis area. Both of these rare plant species are anticipated to decline in the number of individual plants and plant sites under Alternative 4.

The other meadow-dwelling and riparian sensitive species include the moonworts, the hump-mosses, Bolander's bruchia, Blandow's bog moss and the water-veined lichen. While none of these species are abundant in California, they are wide ranging species in decline throughout their historic ranges. Even

though cumulative effects are likely to occur to these meadow-dwelling sensitive species from present and foreseeable future management activities listed in Appendix B, it is not likely to be a trend toward federal listing for these wide-ranging species.

Alternative 4 also has the highest mileage of weed infested routes, with 33.68 miles of infestations on native surface routes and 29.68 miles of motorized routes are infested with noxious and invasive weed species. Alternative 4 potentially affects 49 known sensitive plant sites and suitable habitat areas within 200 feet of weed infested motorized routes. Cumulatively, effects to sensitive plant resources caused by invasive species will be more than Alternative 1. Given the magnitude of the disturbance involved in various activities during the past 150 years, it is likely that historic fire suppression, road and trail construction (designed and unauthorized routes), campground construction, other types of recreation activities including OHV use, timber management, salvage activities, reforestation practices, historic grazing and mining activities, and hydroelectric development have degraded suitable habitat. It is also likely that individual sensitive plants were destroyed by these activities and entire occurrences eliminated. While direct effects to sensitive plant species from disturbances caused by these activities are minimally mitigated by avoidance, indirect effects such as further invasion by noxious weeds occurred.

For the purpose of this analysis, cumulative effects of past activities are represented within the existing conditions. Appendix B provides a list and description of past, present, and reasonably foreseeable projects including private lands within the Forest boundary. Some, but not all, of these activities will contribute to effects on sensitive plant and habitat. Within the project area, hazardous fuels reduction and associated timber harvest have occurred on approximately 25,410 acres of NFS land since 2000 (see Appendix B). These treatments are the primary activity that will alter forest vegetation and impact sensitive plants and habitat. These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Since 2000, approximately 85,000 acres of NFS lands burned in wildfires. Within the project area, prescribed burning occurred on about 22,500 acres between 2000 and 2008. CDF lists a total of 2,365 acres of private land within the Stanislaus National Forest administrative boundary for which timber harvest plans were submitted. On private timberlands, harvest methods include selective thinning and regeneration (clearcut) and then are reforested using herbicides to suppress competing vegetation.

Implementation of Alternative 4 would improve conditions for those sensitive plant populations and their habitats associated with routes not added to the system. Cross country travel prohibitions would reduce effects to unknown populations of plants and reduce the risk of noxious weed introduction. Impacts to sensitive plant occurrences and habitat are expected to increase in the foreseeable future due to the predicted increase in motor vehicle use. Four routes will be mitigated for effects to plants and their habitats in Alternative 4. Monitoring of plant sites, signing and barriers may be implemented where continued impacts from off-road vehicles use are apparent. Compliance efforts may assist in limiting the extent of impacts to the more vulnerable sensitive plant habitats.

Alternative 5 (Resources)

DIRECT AND INDIRECT EFFECTS

1. Cross Country Travel

Cross-Country travel is prohibited in Alternative 5. Proliferation of unauthorized routes is assumed zero or minor. Current use will be discontinued on 220 miles of unauthorized routes. The routes will not be added to the NFTS and allowed to passively recover. Passive recovery and re-vegetation is expected within a 10 year period. Disturbed areas on shallow soils, particularly above 8,000 feet elevation (cold temperature), will recover more slowly. These changes will have a positive effect on soil conditions as compared to the Alternative 2 (see Chapter 3.07, Soil Resource). With less

disturbance from motor vehicles direct impacts would be lessened. Competing vegetation as a result of passive recovery may have an indirect effect on sensitive plants and habitat.

Direct impacts to sensitive species from dispersed recreational access 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 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 plant individuals that occur in a specific location and how many of them are damaged.

2. Additions to the NFTS

This alternative includes 28.37 miles of proposed additions to the NFTS. 8 routes within 200 feet of known sensitive plant occurrences are associated with these additions. This alternative will have less of an impact to sensitive plant communities than alternative 1, 2 and 4. Alternative 5 may potentially directly and/or indirectly affect 9 known sensitive plant sites and suitable habitat areas within 200 feet of proposed additions to the NFTS within the analysis area.

Alternative 5 has the least number of proposed additions to the NFTS into meadows and lava cap areas. Alternative 5 also has the least number of additional miles of weed infested routes, including 25.79 miles of weed infested routes being analyzed.

3. Changes to the Existing NFTS

Vehicle Class

Vehicle class changes would occur on 525.73 miles of NFTS roads. It is assumed that changing the class of vehicle allowed to use a particular road does not change impacts to sensitive species and watchlist plants/plant communities. Effects from all types of motor vehicles are assumed equal. These roads already have hardened surfaces that lack vegetation. It is likely that direct impacts to sensitive species and watchlist 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 200 feet of the road. These indirect and cumulative impacts would continue regardless of the type of vehicle using the road.

Season of Use

Alternative 5 provides for season of use on designated native and non-native NFTS motorized routes. Lower elevations are open all year, middle elevations are open April 15 through November 15, and upper elevations are open May 15 through November 15. This alternative provides for the greatest protection for botanical resources, including sensitive plant resources, with the longest season of use period in comparison to all of the other alternatives. No wheeled over snow use is proposed.

Indicator Measure 1 - Number of sensitive plant sites/ occurrences within 200 feet of motor vehicle routes

Direct and indirect effects may occur to 9 sensitive plant sites and/or suitable habitat areas located within 200 feet of proposed additions to the NFTS. Alternative 5 includes 28.37 additional miles of unauthorized routes that may cause direct/indirect effects to sensitive plant sites and/or suitable habitat areas. The direct and indirect effects that may occur to undocumented plant occurrences and/or suitable habitats under this alternative are unknown.

Based on the assumption that suitable habitats exist along routes in upland and mid slope habitats and lower montane, chaparral, and woodland habitats, fourteen sensitive plant species may be directly or indirectly affected by routes within 200 feet of suitable habitat. These include: Jepson's onion, Yosemite onion, Nissenan manzanita, big-scale balsamroot, Pleasant Valley mariposa lily, Small's

southern clarkia, Merced clarkia, Tahoe draba, Congdon’s woolly sunflower, Parry’s horkelia, short-leaved hulsea, Tuolumne iris, Yosemite lewisia, and slender-stalked monkeyflower.

Indicator Measure 2 - Number of documented direct impacts to sensitive plant sites/occurrences on either side of route’s edge within 30 feet of motor vehicle routes

Alternative 5 contains 8 documented sensitive plant sites with known impacts from motor vehicle use, including driving off-road for parking or dispersed camping access. The BE for Sensitive Plants and Other Botanical Resources shows routes with direct impacts to plants for this alternative (project record). Table 3.02-13 shows the number of potentially affected occurrences for each sensitive plant species along motor vehicle routes included in Alternative 5.

Table 3.02-13 Species and Occurrences within 30 feet of Motor Vehicle Routes: Alternative 5

Species Name	Occurrences
Small’s southern clarkia	1
three-bracted onion	1
Stebbins’s lomatium	4
Parry’s horkelia	2

Indicator Measure 3 - Miles of motorized routes passing through lava caps

This alternative includes 6.3 miles of proposed additions to the NFTS within lava cap areas with sensitive plant sites and suitable habitats. Alternative 5 has the least number of proposed additions to the NFTS in lava cap areas of all of the alternatives. The three-bracted onion (*Allium tribracteatum*) is an endemic occurring on very thin soils in open habitat and is quite vulnerable to OHV activity. This species would be most vulnerable by opening the trails within this habitat in early April (M. Willits, personal communication, January 16, 2009).

Indicator Measure 4 - Miles of motorized routes passing through meadows

This alternative includes 0.2 miles of proposed additions to the NFTS through meadows. Based on the assumption that suitable habitat exist along routes in meadows and riparian areas, seventeen sensitive species, including six mosses, one lichen, five moonworts, Tuolumne fawn lily, Hetch-Hetchy monkeyflower, subalpine fireweed, pansy monkeyflower, and Pilot Ridge fawn lily may be directly/indirectly affected by routes open for public motorized vehicle use through wet areas. Alternative 5 provides the second most protection for meadow and riparian botanical resources of all of the action alternatives.

Indicator Measure 5 - Miles of motorized routes infested with invasive plant species within 200 feet of sensitive plant occurrences and habitat

This alternative include 0.02 miles of proposed additions to the NFTS, infested with invasive plant species and the potential to indirectly and directly affect sensitive plant sites and suitable habitat areas. Seven known noxious and invasive weed infestations are within 200 feet of sensitive plant sites and suitable habitat areas documented for the proposed additions to the NFTS under Alternative 5. Five sensitive plant sites are within 200 feet of noxious weeds that may be indirectly or directly affected by infestations proposed additions to the NFTS under this alternative.

CUMULATIVE EFFECTS

Alternative 5 will provide more protection of botanical resources and conservation of sensitive plant sites and suitable habitat areas than Alternatives 1, 2 and 4. Alternative 3 provides the most protection. Cumulative effects would continue to impact sensitive plants and their habitat, but in a manner that slows the damage incurred from motor vehicle travel. This is mainly due to a reduction in miles of routes open for public motorized vehicle use within and adjacent to suitable habitat areas and plant occurrences, and the prohibition of cross-country travel. Meadow, riparian and other wetland habitats are provided with more protection under Alternative 5, since fewer roads would impact wet

habitats, including areas with suitable habitats and sensitive plant occurrences. Lava cap habitat areas will also be provided with more protection, as Alternative 5 has the least number of proposed additions to the NFTS in lava caps. One route includes mitigation measures for direct and indirect effects to plants. Monitoring and compliance efforts would still be necessary to mitigate damage to the most vulnerable sites.

This alternative includes 25.79 miles of motorized routes infested with noxious and invasive weed species. Alternative 5 potentially indirectly and directly affects 37 known sensitive plant sites and suitable habitat areas within 200 feet of additional and existing miles of weed infested motorized routes. Cumulatively, indirect and direct effects to sensitive plant and other botanical resources caused by invasive species will be less for Alternative 5 than for the Alternatives 1 and 4.

Given the magnitude of the disturbance involved in various activities during the past 150 years, it is likely that historic fire suppression, road and trail construction (designed and unauthorized routes), campground construction, other types of recreation activities including OHV use, timber management, salvage activities, reforestation practices, historic grazing and mining activities, and hydroelectric development have degraded suitable habitat. It is also likely that individual sensitive plants were destroyed by these activities and entire occurrences eliminated. While direct effects to sensitive plant species from disturbances caused by these activities are minimally mitigated by avoidance, indirect effects such as further invasion by noxious weeds occurred.

For the purpose of this analysis, cumulative effects of past activities are represented within the existing conditions. Appendix B provides a list and description of past, present, and reasonably foreseeable projects including, private lands within the Forest boundary. Some, but not all, of these activities will contribute to effects on sensitive plant and habitat. Within the project area, hazardous fuels reduction and associated timber harvest have occurred on approximately 25,410 acres of NFS land since 2000 (see Appendix B). These treatments are the primary activity that will alter forest vegetation and impact sensitive plants and habitat. These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Since 2000, approximately 85,000 acres of NFS lands burned in wildfires. Within the project area, prescribed burning occurred on about 22,500 acres between 2000 and 2008. CDF lists a total of 2,365 acres of private land within the Stanislaus National Forest administrative boundary for which timber harvest plans were submitted. On private timberlands, harvest methods include selective thinning and regeneration (clearcut) and then are reforested using herbicides to suppress competing vegetation.

Although the effects to sensitive plants vary by alternative and the selection of any alternative may contribute to adverse effects on multiple occurrences of sensitive plants, all alternatives, except Alternative 2, represent a decreased risk to sensitive plants than under existing conditions. The six sensitive plant taxa that were most impacted due to the habitat's proximity to routes, will continue to be most at risk in the future. These sensitive taxa include Stebbin's lomatium (*Lomatium stebbinsii*), Tuolumne fawn lily (*Erythronium tuolumnense*), three-bracted onion (*Allium tribracteatum*), Kellogg's lewisia (*Lewisia kelloggii*), Small's southern clarkia (*Clarkia australis*), and Hetch-Hetchy monkeyflower (*Mimulus filicaulis*). These six taxa have sites and suitable habitat adjacent to routes included in all the alternatives with the exception of Alternative 3, which does not have routes with impacts to Kellogg's lewisia, and Alternative 5, which has routes adjacent to occurrences of four taxa.

Summary of Effects Analysis across All Alternatives

Alternatives 1 and 4 decrease the mileage and number of routes available for public motor vehicle use and decrease the potential for direct and indirect effects to sensitive plants and suitable habitat compared to Alternative 2. Alternatives 3 and 5 will reduce the mileage and number of routes available for use and provide the least amount of impacts to sensitive plants and introduction of noxious weed species, compared to Alternative 2.

The reduction in routes and mileage is likely to concentrate OHV use on the routes designated, thereby, increasing the potential for effects to roadside sensitive plant occurrences on those routes. Continuation of the introduction of noxious weeds will occur regardless of which alternative is selected. Alternatives with fewer routes open for public motorized vehicle use, especially those that exclude routes that are weed infested, provide a reduced risk for vectoring of seeds by motor vehicles, and may decrease the spread of weeds to non-infested portions of these routes and other parts of the forest. When the motor vehicle use on unauthorized routes ceases, 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 2004). 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.

Sensitive plant species were adversely affected by roadside brushing, piling and burning, erosion seeding, grading, hazard tree removal, noxious weed introduction and road and culvert failure. Effects of roads on Sensitive plants may occur within the roadside hazard tree removal zone. This zone, which occupies about 14% of the Stanislaus roaded acres, is the area within which roadside hazard tree removal is likely to affect botanical resources.

Continued activities of annual road and trail maintenance such as grading and brushing could have direct effects to sensitive plant populations adjacent to these facilities with narrow road or trail prisms. These plant populations occupy about 2% of the Stanislaus roaded acres.

Stebbin’s lomatium and Kellogg’s lewisia grow in lava cap habitat areas where the highest densities of motorized routes occur in the analysis area. Both of these rare plant species are anticipated to decline in the number of individual plants and plant sites under all of the Alternatives.

Table 3.02-14 gives the summary of effects of motorized routes to Sensitive Plants, Habitats and Noxious Weeds on the within the analysis area.

Table 3.02-14 Botanical Resources Indicator Measures

Indicator Measures	Alternative				
	1	2	3	4	5
Additions to the NFTS with sensitive plant sites within 200 ft	68	0	0	102	8
Additions to the NFTS within meadows (miles)	1.8	0	0	2.1	0.2
Additions to the NFTS through lava caps with known plant sites (miles)	29.3	0	0	32.1	6.3
Sensitive plant sites with within 30ft of Routes (occurrences)	493	612	410	533	419
Sensitive plant sites with noxious weed infestations within 200 ft	22	41	41	17	5
Weed infested additions to the NFTS (miles)	0.80	0	0	4.0	0.02
Weed infested motorized routes (miles)	26.66	29.52	29.52	33.68	25.79

Table 3.02-15 presents the direct and indirect effects to sensitive plants by alternative for each indicator measure developed. The effects were analyzed for Alternatives 1, 4 and 5 with miles of proposed additions to the NFTS and with total miles of existing and proposed additions to the NFTS for all alternatives.

From the results presented in Table 3.02-15, Alternative 3 will have the least amount of impact to unique habitats such as lava caps and meadows and will have the least amount of overall impacts to sensitive plant sites. Alternative 2 has the most effect to sensitive plants and suitable habitats and lava cap and moist habitat types along existing routes. Of the action alternatives, Alternative 4 has the highest direct impacts to known sensitive plant site and the greatest risk to sensitive plants affected by routes within 200 feet of areas infested with noxious and invasive plants.

Table 3.02-15 Direct and Indirect Effects to Sensitive Plants

Sensitive Plant Occurrence Effects	Indicator Measure	Alternative				
		1	2	3	4	5
Sites directly/indirectly affected (w/in 200 ft) by additions to the NFTS	1	83	0	0	123	9
Sites directly/indirectly (w/in 200 ft) affected by all roads and trails	1	493	612	410	523	419
Sites directly affected by additions to the NFTS	2	59	0	0	69	8
Sites directly affected by total number of routes	2	111	101	55	123	64
Sites directly/indirectly affected on lava caps by all roads and trails	3	31	0	0	36	6
Sites directly/indirectly affected on lava caps by total number of routes	3	43	166	12	48	18
Sites directly/indirectly affected in moist habitats by additions to the NFTS	4	33	0	0	15	0
Sites directly/indirectly affected in moist habitats by all roads and trails	4	51	66	18	33	18
Sites directly/indirectly affected by noxious (w/in 200 ft) by additions to the NFTS	5	22	0	0	17	5
Sites directly/indirectly affected by noxious (w/in 200 ft) by all roads and trails	5	63	41	41	58	46

Table 3.02-16 presents the direct effects to sensitive plants and one moss by species as measured by using the numbers in Indicator Measure 3 and adding the proposed alternative numbers from 1, 4 and 5.

Table 3.02-16 Direct Effects to Sensitive Plants

Plant Species	Alternative				
	1	2	3	4	5
<i>Lomatium stebbinsii</i>	26	68	31	30	4
<i>Allium tribracteatum</i>	4	18	5	5	1
<i>Clarkia australis</i>	7	45	39	9	1
<i>Clarkia biloba ssp. australis</i>	2	25	24	2	0
<i>Mimulus filicaulis</i>	9	15	14	11	0
<i>Horkelia parryi</i>	5	19	10	6	2
<i>Erythronium tuolumnense</i>	3	28	12	4	0
<i>Cypripedium montanum</i>	0	4	4	0	0
<i>Mimulus pulchellus</i>	0	15	10	0	0
<i>Lewisia kelloggii ssp. kelloggii</i>	3	3	0	4	0
<i>Eriophyllum nubigenum</i>	0	3	0	0	0
<i>Hydrothyria venosa</i>	0	2	1	0	0
<i>Iris hartwegii ssp. columbiana</i>	0	1	1	0	0
<i>Balsamoriza macrolepis var. macrolepis</i>	0	0	0	0	0
<i>Moss Species</i>					
<i>Bruchia bolanderi</i>	0	2	1	0	0
Additions to the NFTS with Direct Effects to Plants	55	0	0	69	8
Total	210	248	155	224	163

Table 3.02-17 shows the potential direct impacts to sensitive plants and unique habitat increases with proposed additions to the NFTS under Alternatives 1 and 4, respectively.

Table 3.02-17 Summary of Effects for Botanical Resources

Indicators – Botanical Resources	Rankings of Alternatives for Each Indicator ¹				
	1	2	3	4	5
Unauthorized routes within or adjacent to sensitive plant sites or within or adjacent to suitable sensitive plant habitat.	3	1	5	2	4
Routes open for public motor vehicle use within or adjacent to sensitive plant sites.	3	1	5	2	4
Routes open for public motor vehicle use with documented disturbances from motor vehicles that resulted in damage to individual sensitive plants or to habitat.	3	1	5	2	4
Density of routes open for motor vehicle use within areas of suitable TES plant habitat where occurrences exist (e.g., lava caps)	1	3	5	2	4
Routes open for motor vehicle use within moist habitats (miles)	1	3	5	2	4
Average for Botanical Resources	2.2	1.8	5.0	2.0	4.0

¹ A score of 5 indicates the alternative has the least impact on this resource; a score of 1 indicates the alternative has the most.

Determination of Effects

It is my determination that the Stanislaus National Forest Motorized Travel Management EIS:

1. Would have no effect on the sensitive plant species: Tahoe draba (*Draba asterophora* var. *asterophora*);
2. May affect individuals but likely would not result in a trend toward federal listing for the following sensitive plant species:

Jepson's onion (*Allium tribracteatum*), three-bracted onion (*Allium tribracteatum*), Yosemite onion (*Allium yosemitense*), Nissenan's manzanita (*Arctostaphylos nissenana*), big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*), upswept moonwort, (*Botrychium ascendens*), scalloped moonwort (*Botrychium crenulatum*), common moonwort (*Botrychium lunaria*), Mingan's moonwort (*Botrychium manganese*), Pleasant Valley Mariposa lily (*Calochortus clavatus* var. *avius*), Small's southern clarkia (*Clarkia australis*), Mariposa clarkia (*Clarkia biloba* ssp. *australis*), Merced clarkia (*Clarkia lingulata*), mountain lady's slipper (*Cypripedium montanum*), subalpine fireweed (*Epilobium howellii*), Congdon's woolly sunflower (*Eriophyllum congdonii*), Yosemite woolly sunflower (*Eriophyllum nubigenum*), Taylor's fawn lily (*Erythronium taylori*), Tuolumne fawn lily (*Erythronium tuolumnense*), Parry's horkelia (*Horkelia parryi*), short-leaved hulsea (*Hulsea brevifolia*), Tuolumne iris (*Iris hartwegii* ssp. *columbiana*), Congdon's bitterroot (*Lewisia congdonii*), Yosemite lewisia (*Lewisia disepala*), Kellogg's lewisia (*Lewisia kelloggii* ssp. *kelloggii*), Stebbin's lomatium (*Lomatium stebbinsii*), slender lupine (*Lupinus gracilentus*), Hetch-Hetchy monkeyflower (*Mimulus filicaulis*), slender-stalked monkeyflower (*Mimulus gracilipes*), pansy monkeyflower (*Mimulus pulchellus*), and sensitive lichen species: veiny aquatic lichen (*Hydrothyria venosa*); and sensitive moss species: Bolander's bruchia (*Bruchia bolanderi*), Bolander's bruchia (*Helodium blandowii*), three ranked hump moss (*Meesia triquetra*), broad nerved hump moss (*Meesia uliginosa*), and elongate copper moss (*Miclichoferia elongata*).

Compliance with the Forest Plan and Other Direction

All alternatives comply with the Forest Plan S&Gs for botanical resources. In accordance with the Forest Plan, mitigation measures specified below will be implemented. These mitigation measures will provide benefits to sensitive and watchlist species and other native vegetation.

Sensitive Plant Mitigations

Four routes require mitigation measures, due to direct impacts to the sensitive plants and their habitats. These routes are within the Deer Creek area with impacts to the Tuolumne fawn lily, and also the Stebbin's lomatium occurrences in one area. It is recommended that these areas be re-surveyed, mapped and monitored for continual impacts. Many other routes, especially ones with impacts to lava cap habitats are identified in the site specific analysis as having sensitive plant and noxious weed occurrences and are addressed within the season of use closures. Further monitoring of these areas is recommended, and if impacts continue another analysis of these routes would be required for further protection.

- 15EV38 – rock barriers to be placed 50 feet at base of incline to deter vehicles from sensitive plants; Recommend accurately mapping and monitoring occurrence 16-9D of Tuolumne fawn lily (Alternatives 1, 4 and 5). Further suggest post fence to minimize impacts at access point on 3N58, per district botanist recommendation, where dispersed camping access is associated with two sensitive plant species occurrences.
- 16EV108 – log barriers to be placed 50 feet at base of hill climb to prevent trail access and widening, and access to lava cap and lomatium occurrence. Tractor is not recommended and barrier type would require no digging (Alternatives 1 and 4).

- 16EV209 – Post fence or rock barriers 740 feet along creek and occurrence; Recommend survey, mapping, and monitoring Tuolumne fawn lily occurrences (Alternative 4).
- 16EV265 - rock barriers 182 feet along occurrence of Tuolumne fawn lily to prevent further impacts from vehicles and weed disbursement (Alternatives 1 and 5).

Mitigation for Noxious Weeds

Mitigation measures are limited and difficult to implement in preventing weed spread. Standard project prevention measures (e.g., equipment and vehicle washing before entering uninfested areas) are not applicable under travel management. Mechanical treatments of noxious weeds are labor intensive and expensive, require many years of repeated treatment, and are impractical for the amount of infestation. Chemical treatments are limited primarily to yellow starthistle on the three districts within the analysis area. Unless an environmental analysis is approved for chemical treatment of invasive species, the risk of spreading noxious weeds will remain high within and adjacent to infested areas.

Best Management Practices are proposed to the Regional Office, streamlining direction for Invasive Plant Prevention and Management. The objective of this proposal is to incorporate invasive plant prevention as an important consideration in all recreational land use and access decisions, and to use Forest-level Access and Travel Management planning to manage travel and travel routes to reduce the introduction, establishment and spread of invasive plants. This proposal helps place greater emphasis on managing previously “unmanaged recreation” (OHVs, dispersed recreation, etc.) to help reduce creation of soil conditions that favor invasive plants, and reduce transport of invasive plant seeds and propagules.