

BIOLOGICAL EVALUATION  
Sensitive Plant Species

Smith River National Recreation Area  
Restoration and Motorized Travel Project FEIS  
Six Rivers National Forest  
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Prepared by:   
John McRae  
Assistant Forest Botanist  
Six Rivers National Forest

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## I. INTRODUCTION

The objectives of this biological evaluation are (a) to determine the effects of the proposed action on any sensitive botanical species and (b) to insure these species receive full consideration in the decision-making process to maintain species viability (FSM 2672.4).

## II. CURRENT MANAGEMENT DIRECTION

Current policy for Sensitive plants as stated in the Land Management and Resource Plan for Six Rivers National Forest includes the following: After completion of the evaluation, proposed actions will be prohibited if they are found likely to jeopardize the continued existence of species or the maintenance of viable populations throughout their existing range (LRMP S&G 6-2).

Current policy for Sensitive plants as stated in the Forest Service Manual include the following elements:

- Maintain viable populations of all native and desire non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands (FSM 2670.22).
- Avoid or minimize impacts to species whose viability has been identified as a concern (FSM 2670.32).
- If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole (FSM 2670.32)

## III. DESCRIPTION OF PROPOSED ACTIONS

The preferred alternative, Alternative 6, of the Smith River National Recreation Area Restoration and Motorized Travel Management (SRNRARMTM) project on Six Rivers National Forest proposes to:

- Add selected unauthorized access routes (UARs) as roads to the National Forest Transportation System (NFTS).

- Add selected UARs as motorized trails to the NFTS.
- Upgrade selected NFTS roads from closed (ML 1) to open (ML 2)..
- Downgrade select NFTS roads from open (ML 3) to mixed use (ML 2)
- Decommission selected NFTS roads to non system (closed)
- Convert selected NFTS roads to motorized trails
- Designate parking areas on 17N49
- Restore hydrological function on selected UARs
- Barricading UARs not added to the NFTS.

#### **IV. EFFECTS ANALYSIS METHODOLOGY**

##### **Review of Best Available Science**

In the first step of the analysis review of existing data sources were used to identify federally listed, sensitive, and S&M botanical species that are known or are believed to have potential to occur in the analysis area (FSM 2672.43). A list of federally listed species to review for the analysis was compiled using the Arcata USFWS office on-line IPaC (Information for Planning and Conservation) search page (USDI 2016). The list of sensitive botanical species was from the USDA Forest Service Region 5 Sensitive Species List (USDA Forest Service 2013).

The second step in the analysis of effects on sensitive botanical species were informed by field reconnaissance surveys conducted at the time of year when plants were evident and identifiable. Inventories of sensitive rare plants from past field surveys, monitoring, and personal field observations were utilized along with additional surveys on a subset of inventoried UARs, which includes motorized trails contained in the project, specifically in those areas where target species could be affected to determine the presence or absence of federally listed plant species, or Region 5 Forest Service sensitive plants (herein referred to as sensitive plant species). Where detected, federally listed or sensitive plants were documented by species and the number of ramets or above ground stems (referred to as individuals herein) were tallied by occurrence—an occurrence being an aggregation of plants that are geographically separated by another aggregate by less than a quarter mile . Occurrences for species analyzed in this document are commensurate with sub-populations. National Forest Transportation System roads were not surveyed as their highly altered, engineered surfaces are not considered suitable habitat for the target species nor are the target species known to occur on these surfaces.

##### **Sensitive Plant Species Management Actions**

Although it is likely the plant occurrences associated with motorized use of UARs have already been affected; the magnitude of human disturbances are unknown. Plants that are present on UARs, including the sensitive plants analyzed in this project, naturally occur in open settings with a relatively high percentage of bare ground. These plants have evolved with some level of natural disturbance (i.e. fire) and therefore have adapted

mechanisms such as development of an underground stems called rhizomes that facilitate re-establishment after disturbance.

In light of adaptations to disturbances, these sensitive plant species have tolerated the current low level of use that has been occurring as indicated by the relatively high numbers of plants found within 30 feet of UARs, compared to numbers beyond the human disturbance distance. The higher numbers of plants within 30 feet compared to further 30 to 100 feet out (7834 within 30 feet vs 3890 30 to 100 feet) is perhaps due to disturbance conditions simulated by motorized vehicle use (e.g. creation of openings for subsequent seed germination, reduced competition by other plants).

Adaptations to disturbance and disturbance tolerances are considered when determining thresholds of management concern. Reducing uncertainty over time by accruing information about a sensitive plant population provides the ability to adjust elements of the actions, from sampling frequency to thresholds of response, as new information is gained. The sensitive plant species management actions aims to detect change in sample populations relative to thresholds of concern set for individual plant species in order to:

1. Update baseline conditions for the four sensitive plant species that will refine, if needed, thresholds triggering management response,
2. Determine if changes in a sensitive plant occurrence are occurring within the active road prism and adjacent to the UAR by using a paired sampling approach,
3. In coordination with the line officer, identify and implement the applicable management response (e.g., barricading) to prevent a decline more than the specified allowable threshold of concern.

The monitoring methodology implemented over a 10 year period is described in detail in the project appendices.

*Thresholds of Concern and Management Actions*

Management response thresholds leading to management actions are identified in Table 1, identifying the point at which management actions are triggered to avoid a 20 percent decline (threshold of concern) in sample populations (the number of individuals) over a 5 year sampling period.

Table 1. Management Response Thresholds.

Thresholds	Opposite leaved lewisia	Serpentine Indian pink	Howells jewelflower	Western bog violet
Alt 6 Plant Totals within 30 feet of UARs	260	6,678	1,96	700
Plant numbers- triggering a management concern	26	1,002	20	105
Plant Decline – percent plant decline in relation to baseline	10%	15%	10%	15%
Alternative 6 Occurrence Totals	4	13	3	3
Occurrence decline-a decline in an occurrence with at least a good viability ranking triggering a management concern	0	0	0	0

The management response thresholds incorporate the number of plants within 30 feet of the UAR inventoried and the number of occurrences those plants represent. Additionally, professional knowledge of the respective species is factored into determining thresholds such as a species growth habit (perennial or annual, rhizomatous or not), b) its phenology (e.g. season of emergence, blooming and dormancy if applicable), or c) habitat setting and vulnerability (e.g. opposite-leaved lewisia occupies habitat of relatively gentle topography compared to Howells jewelflower which can occupy rocky slopes) in determining a given species management response threshold.

The management response threshold for direct effects is lower than the threshold of concern identified in the Forest Plan (USDA Forest Service 1995), in order to provide time for corrective action to occur before the threshold of concern is reached. The percentages Table 1 reflect the culmination of the aforementioned factors to foreshadow when a given species viability is a concern and when management response is needed. The opposite-leaved lewisia and Howells jewelflower which are represented by low plant counts have a management response threshold of 10 percent. The management response threshold for the serpentine Indian pink and the western white bog violet is 15 percent. These thresholds can change if baseline data reveals that population size has changed significantly since survey data was last collected for these species in 2006 and 2014.

If a management response threshold is breached due to motorized use of UARs, a concern for species viability is triggered thus warranting line office involvement and management action that includes: barricading the affected occurrence, buffering the occurrence with boulders, or having use restricted or prohibited by order of the forest supervisor (Forest Plan standard and guideline 18-24, IV-128).

#### *Methodology for Monitoring Management Response Threshold*

Important background is the definition of *occurrence* for the purposes of collecting the baseline and effects data associated with management. Surveys performed for the *Smith River National Recreation Area Restoration and Motorized Travel Management Project* were restricted to within 100 feet of UARs by the District Ranger. One of the consequences of restricting sensitive plant surveys to 100 feet of UARs is that our universe of a species' occurrence, against which we measure viability losses, is also restricted. The context of a given sensitive plant's occurrence is now defined as within 100 feet of UARs. The distribution of the sensitive plant, if any, beyond this parameter of 100 feet, does not apply to the analysis of viability since no surveys were conducted beyond this distance for the project.

#### Baseline Data Collection – Phase 1

Project surveys for the opposite leaved lewisia, the serpentine Indian pink and Howells jewelflower occurred in 2006 and are considered dated in terms of establishing a baseline for the respective occurrences against which current thresholds can be evaluated and updated as necessary. Western bog violet surveys have occurred more recently than the other species (2014), but not over consecutive years.

Baseline data collection of sensitive plant occurrences corresponding with UARS will occur within three years prior to designating a UAR as a motorized trail or road on the

MVUM and occur within that time frame over at least two consecutive years. The consecutive years of sampling is an attempt to account for year-to-year fluctuations due to natural population variations. Data collection will occur in keeping with the phenology of the respective species, which typically ranges from late April and May for opposite-leaved lewisia and western bog violet and June to July for serpentine Indian pink and Howells jewelflower.

Data (e.g. counts of individuals/ramets, bare ground cover, associating species) will be collected within one meter quadrats along paired transects that are monumented to improve accuracy in re-locating quadrat installation points and repeated sampling. Given its scattered, non-clumped distribution, sampling methodology for Howells jewelflower will depart from the quadrat methodology and instead focus on a count of individuals along a transect and paired sampling where it can be accommodated.

Paired transects will provide a comparison between plants in a setting most vulnerable to direct effects by motor vehicles against those that are not. The respective transects will correspond to this gradient of disturbance with one located within the travel way and the other in close proximity on the edge or sides that are unlikely to be impacted by vehicular disturbance.

A backdrop to these management actions is that the proposed action would designate existing inventoried UARs as motorized trails or roads that have experienced a low level use of motorized recreation use over the years. Baseline data will therefore reflect some level of previous disturbance.

#### Monitoring – Phase 2

Once baseline data is collected, management response thresholds are reviewed by a journey level botanist based upon such factors as changes in plant numbers of an occurrence and visual signs of motorized use. Monitoring would begin in keeping with the designation of the UARs on the MVUM and the commencement of use.

The types of data collected will follow that of the baseline data collection and sample the same paired transects and associated quadrats. In addition:

1. Data collected along the transect not effected by motorized use outside of the immediate travel way will serve as the reference against which the data collected along the transect directly affected within the travel way will be compared. Measurements along the transect out of the travel way will aim to account for natural fluctuations in the occurrence.
2. Additional metrics will be added pertaining to direct effect measurements, such as the number of individuals crushed by vehicle tires, documentation of wheel ruts present in quadrat, etc.
3. Photo points will be established.
4. Traffic counters will be installed initially to capture quantity and rate of motorized use along those UARs associated with sensitive plant monitoring. This information may assist in correlations relative to extent of direct effects to the occurrence.

Frequency and duration of monitoring will be evaluated based on monitoring results from the prior year. Initially monitoring will occur annually. The yearly frequency may be lessened (i.e. every second or third year) if data collected over subsequent years indicates that there is little or no difference from reference conditions. If subsequent years indicate that there are changes to the reference condition due to motorized use, more frequent monitoring will resume and may indicate a need to monitor beyond 10 years. If at any time during monitoring a downward trend is detected in any of the four sensitive species measured, the data will be analyzed in relation to the management response thresholds discussed in the next section.

### Thresholds of Concern and Management Actions

The management response threshold shown in Table 1 identifies the point at which management actions are triggered to avoid a loss of viability or trend toward federal listing of the species. Professional knowledge of the respective species is factored into determining thresholds such as a species growth habit (perennial or annual, rhizomatous or not), b) its phenology (e.g. season of emergence, blooming and dormancy if applicable), or c) habitat setting and vulnerability (e.g. opposite-leaved lewisia occupies habitat of relatively gentle topography compared to Howells jewelflower which can occupy rocky slopes) in determining a given species management response threshold. The management response threshold in the proposed action is lower than the threshold of concern identified in the Forest Plan (USDA Forest Service 1995) which is identified as a more than 20% decline in the number of individuals over a 5 year sampling period. The management response threshold is lower in order to provide time for corrective action to occur before the threshold of concern, indicating a loss of viability or trend toward federally listing, is approached.

The loss of an occurrence with a good or better viability rating would represent a management response threshold. An assessment of viability loss will generally incorporate methodology developed by NatureServe whose rankings are used by the Forest Service to designate Sensitive species. The California Natural Diversity Data Base, which is the California based NatureServe organization, provides a definition of an element occurrence (herein referred to as an occurrence) which is used to identify finite spatial portions of meta-populations that have practical conservation value as evidenced by potential continued presence or regular occurrence at a given location (NatureServe 2002). This methodology provides a succinct assessment of estimated viability or probability of persistence to assess the likelihood of whether an occurrence will persist for a defined period of time by ranking them on a scale from 'A' (excellent estimated viability) to 'X' (extirpated). The occurrence rank reflects "the degree to which people have directly or indirectly adversely impacted community composition, structure, and/or function, including alteration of natural disturbance processes". In general, occurrences are ranked on the basis of size (both spatial and population abundance), condition and landscape context. An occurrence with at least good (i.e., excellent-to-good) viability exhibits favorable characteristics with respect to population size and/or quality and quantity of occupied habitat; and, if current conditions prevail, the occurrence is likely to persist for the foreseeable future (NatureServe 2009). Evaluating a downward change in viability rating of an occurrence will be based on the NatureServe ranking methodology titled "Key for Ranking Species Element Occurrences Using the Generic Approach" (Tomaino, 2008). The evaluation will be performed by a journey level botanist who is knowledgeable of the sensitive plant species affected and their analysis of a comparison between baseline data and monitoring data collected over time.

The percentages in Table 1 reflect the culmination of the aforementioned factors to foreshadow when a given species' viability is a concern and when management response is needed. The opposite-leaved lewisia and Howells jewelflower which are represented by low plant counts have a management response threshold of 10 percent. The management response threshold for the serpentine Indian pink and the western white bog violet is 15 percent. These thresholds can change if baseline data collection reveals that population size has changed significantly since survey data was last collected for these species in 2006 and 2014.

If a management response threshold is breached due to motorized use of UARs, a concern for species viability is triggered thus warranting line office involvement and management action that includes: barricading the affected occurrence, buffering the occurrence with boulders, or having use restricted or prohibited by order of the forest supervisor (Forest Plan standard and guideline 18-24, IV-128). If impacts are noted that are below the management response threshold but which create a concern for a downward trend, actions such as, but not limited to, signing or route delineation will be implemented

### **Assumptions specific to botanical resources analysis**

- Vehicle use has been occurring on UARs from unintended illegal motorized recreation.
- Vehicle use on UARs in the project area is currently low due to the remoteness of the project area from urban centers.
- Use will fluctuate from year to year and with increasing use, the likelihood of damage to sensitive plant species will increase.
- Vehicle use has affected and has the potential to affect rare plant populations, either directly by damage or mortality of individual plants from motor vehicles (stem breaking, crushing, etc.).
- It is assumed that the difference in the change of a population when compared to the control population is due to the effects of the project (e.g., effects of motorized travel).
- The Sensitive Plant Species Management Actions are an essential component to preclude unacceptable effects to rare sensitive plant species directly affected by motorized use. If a management response threshold is breached due to motorized use of UARs, a concern for species viability is triggered thus warranting line office involvement and management action that includes: barricading the affected occurrence, buffering the occurrence with boulders, or having use restricted or prohibited by order of the forest supervisor (Forest Plan standard and guideline 18-24, IV-128).
- Motor vehicle use is unlikely to impact some occupied rare plant habitat that is inaccessible due to the steep or rocky nature of the surrounding terrain or where dense vegetation acts as a barrier.
- Motor vehicle use is more likely to impact sensitive rare plant occupied habitat which exist on gentle slopes or flat terrain with little or no vegetation or natural barriers to motor vehicles.

- Without specific prevention and/or control measures, invasive non-native plants (weeds) will continue to spread along and within surfaced and unsurfaced motor vehicle roads/trails/areas.
- National Forest Transportation System roads are not considered suitable habitat for the rare plant species analyzed due to their altered engineered surfaces, nor are the target federally listed endangered or sensitive species known to occur on these surfaces.
- Direct effects effect those plants that occur within 30 feet of the center of inventoried UARs and that fall below the management response threshold. Plants and occurrences within 30 feet that fall above the management response threshold will be protected from direct effects.
- The management response threshold will trigger actions designed to prevent a loss of viability for an occurrence where an occurrence with a good or better viability rating (based on the NatureServe viability ranking methodology) is trending toward a reduction to a poor or lower rating resulting from motorized vehicle use. Therefore there will be no direct effect to occurrences of sensitive plant species.
- There are no indirect effects. Indirect effects would be those that occur 30 to 100 feet from the center of inventoried UARs. Indirect effects, which are limited to dust accumulation and the introduction of invasive species, neither of which was observed during surveys, will not result in sensitive plant damage or mortality or the loss of an occurrence.
- Removing motorized use by barricading UARs not designated on the NFTS can benefit, federally listed endangered and sensitive plant species by protecting them from motorized use.
- Restoration of drainage patterns proposed for UARs will benefit sensitive plant species, particularly those that occur in serpentine wetland habitat or those like the opposite-leaved lewisia which grows on or adjacent to UAR 305.109A (Pine Flat Mtn.) and occurs in flat depressions that are saturated in the spring. It is recommended that a botanist review the final restoration plan to insure that federally listed endangered, and Region 5 sensitive plant species benefit from and are not adversely affected by routes proposed for restoration of drainage patterns.
- Blocking non-designated trails or spurs that have received motorized use in the past that intersect the UARs will benefit Region 5 sensitive plant species that occur on or adjacent to these spurs. Of particular concern is a trail that intersects UAR 305.109 (Pine Flat Mtn.) where there is a population of the Region 5 sensitive opposite-leaved lewisia growing in the intersection. It is recommended that a Botanist be present when this intersection is blocked via route delineation to avoid damaging individuals of this species.
- Performing road maintenance on UARs where sensitive plant species are present has the potential to directly affect them and trigger management action. It is recommended

that a botanist review road maintenance plans prior to implementation to avoid direct effects to sensitive plant species present on UARs.

- The context of a given sensitive plant's occurrence is now defined as within 100 feet of UARs. The distribution of the sensitive plant, if any, beyond this parameter of 100 feet, does not apply to the analysis of viability since no surveys were conducted beyond this distance for the project.
- Reference throughout the document refers to the number of plants or the number of individuals although the numbers herein refer to counts of above ground stems. Determining the number of plants or individuals would require digging plants up as all Sensitive species analyzed herein are capable of producing multiple stems from a single crown, taproot or rhizome.

### **Data Sources**

- Plant nomenclature follows The Jepson Manual Vascular Plants of California, Second Edition (Baldwin, et al. 2012).
- Route-specific botanical data including site-specific surveys for rare species with a focus on UARs proposed to be designated on the NFTS.
- Existing sensitive plant and known sites S&M data stored in forest Microsoft Access database and in the National Resource Information System (NRIS) database.
- GIS layers of road inventories, serpentine and wetland habitats, botanical areas, RNAs, National Agricultural Imagery Program (NAIP) satellite imagery.
- Professional knowledge of species habitat and distribution on the forest to determine which species would be considered for pre-disturbance surveys.
- Route inventories collected in Step 1 of Travel Management and associated tabular data sets.
- Records from the California Natural Diversity Data Base (CNDDB) and the Consortium of California Herbaria.
- A list of federally listed species to review for the analysis was compiled using the Arcata US Fish and Wildlife Office on-line IPaC (Information for Planning and Conservation) search page (USDI 2016).

## **V. EXISTING ENVIRONMENT**

### Background

The area affected by the proposal includes Smith River National Recreation Area (SRNRA). The Smith River National Recreation Area (Smith River NRA) is located in the Klamath-Siskiyou Ecoregion of Northwest California and Southwest Oregon which is recognized as an area of extraordinary biodiversity (Whittaker 1960; Kruckeberg 1984). More than 1,859 plant species, including 150 endemics are known to occur in the Klamath-Siskiyou Ecoregion (Olson et. al. 2002). Of the endemism characteristic of the

Klamath-Siskiyou Ecoregion, the majority is represented within habitats associated with the Josephine ultramafic sheet that extends from Northwestern California to Southwestern Oregon. This belt of ultramafic parent material is one of the largest in North America and has the greatest concentration of endemic plant species restricted to this substrate (Kruckeberg 1984). Ultramafic parent materials, generically called serpentine, weather into soils that are high in heavy metals and low in essential nutrients. This serpentine soil chemistry along with other biological and physical factors, gave rise to distinctive plant communities that support a preponderance of rare plant species, many of which only occur on serpentine soils, resulting in their characterization as serpentine endemics. Serpentine endemics are generally confined to serpentine substrate because they require the reduced competition of harsh, open, rocky sites (Brooks 1987).

The important role serpentine plays in providing habitat to support a significant number of rare species in California is exemplified by the fact that only 1.5 percent of the State is underlain by ultramafic rock and yet 13 percent of the plant species endemic to California are serpentine endemics (Safford et. al. 2005). The Centre for Plant Diversity's tracking of endemism notes that within the California Floristic Province the Josephine ultramafic sheet is one of the richest in endemics. In addition, serpentine settings support the highest number of plant associations described in the Klamath Province which includes the Six Rivers and Klamath National Forests (Jimerson 1995).

## Plant Habitats

Habitats within the project area that support the highest number and diversity of rare plants include seasonally dry serpentine settings and serpentine wetlands. Within these habitats there are at least 27 plants considered rare by the California Native Plant Society, *eight* which are members of the Region 5 Forest Service Sensitive Plant list, and one federally listed Endangered plant species.

Seasonally dry settings include outcrops and bouldery serpentine barrens, Jeffrey pine woodlands, and shrub dominated areas. Low vegetative cover, and high bare soil and high surface rock cover characterize these habitats. Due to their ridge position, gradual slopes, and openness, some of the barren and woodland habitats are vulnerable to cross-country travel that can result in the loss of plants and vegetative material, habitat fragmentation, and potential water diversion.

Serpentine wetlands have saturated soils or running water year round. These wetland habitats are characterized by the presence of surface (perennial or intermittent) water or sub-surface water in the form of spring or seep flow. Ground water flow paths which are dependent on optimal seasonal rainfall are important for the maintenance of saturated soil conditions upon which the serpentine wetlands and their rare species depend. Decreases in seasonal rainfall via drought or disruption of water flow paths from diversion or upslope disturbances are the greatest threat to the persistence of rare serpentine wetland species analyzed herein.

Topographically flat serpentine wetlands are known for their rare plant species, sedges, and ericaceous shrubs with a low canopy cover dominated by Port-Orford-cedar. These wetlands can be relatively extensive, for example, L.E. Horton Research Natural Area spans approximately 40,000 square meters (1,560 acres). Serpentine wetland seeps are usually very localized sites where sub-surface water intersects the ground surface. Serpentine wetland riparian habitats for rare plants are associated with a perennial to intermittent flow of surface water across a gradient, boulder-lined stream banks with a

low cover of ericaceous shrubs (western azalea being a common associate) and a moderate canopy cover dominated by Port-Orford-cedar.

Due to the array of Sensitive and rare species, their habitats and diverse plant communities in the Josephine ultramafics, 21,370 acres in the North Fork Smith River watershed was established as a botanical area- the North Fork Smith Botanical Area (USDA Forest Service 1995). Botanical areas are established to protect areas of the Forest with important botanical resources (36 CFR 294.1). Also associated with the Josephine ultramafics is the L.E. Horton Research Natural Area. Research natural areas are established to study and maintain biological diversity on National Forest system lands (FSM 4063). L.E. Horton Research Natural Area supports an extensive serpentine wetland with numerous rare and Sensitive plant species.

While the serpentine soil chemistry is a primary factor influencing the botanical distinctiveness of this area, it is the heavy metals (i.e. chromium, nickel) within the parent material that has driven minerals mining and exploratory mining. As a result, the environment has been altered by development of roads, exploratory grids, mining spoil sites, mining pits and adits. The most recent exploratory mining occurred approximately 40-45 years ago. Mining-related disturbance is particularly evident on Gasquet Mountain.

Inventoried unauthorized routes analyzed herein have a long history of use. Current use is apparent from observations indicating fresh vehicle tracks and road side trash, primarily on routes originating from minerals exploration. Based on knowledge resulting from botanical surveys a greater number of Sensitive plant species grow on and adjacent to these routes, in spite of damage and death that can result from motorized vehicle use, as opposed to areas surveyed that are more than 30 feet beyond. Hence it is possible that vehicle related disturbance provides some benefit under the current low level of use.

Frequent use of an area can have detrimental effects to federally list Endangered and Sensitive plant species. Motorized recreation vehicles have impacted a location of the federally listed Endangered McDonald's rockcress not in the project area, adjacent to County Road 305 approximately 1.5 miles before it enters Oregon. The Forest Service has attempted to mitigate impacts to the site by placing large boulders around the plants. The site is being monitored to evaluate the effectiveness of the boulders. A user created route through a serpentine wetland within the project area on Gasquet Mountain extirpated a number of individuals of the Sensitive plant species, the western bog violet. This user created route is not proposed for designation to the NFTS. Although not a site within the project boundary motorized vehicles have repeatedly driven off road onto a flat open area adjacent to Forest Service road 17N21 which has extirpated over half of the opposite leaved lewisia plants, a Sensitive plant species that once occurred there.

Federally list Endangered, Sensitive plant and Survey and Manage species known or thought to occur on the Smith River National Recreation Area are listed in Table 2.

Table 2 - Federally listed Endangered, Sensitive species, and Survey & Manage species Known or Thought to occur on Smith River National Recreation Area

Scientific Name	Taxa Group	Status
<i>Bochera koehleri</i>	vascular plant	Sensitive
<i>Arabis mcdonaldiana</i>	vascular plant	Endangered
<i>Boletus pulcherrimus</i>	fungi	Sensitive
<i>Buxbaumia viridis</i>	bryophyte	Sensitive
<i>Calicium adpersum</i>	lichen	Sensitive

Scientific Name	Taxa Group	Status
<i>Cypripedium fasciculatum</i>	vascular plant	Sensitive
<i>Cypripedium montanum</i>	vascular plant	Sensitive
<i>Dendrocollybia racemosa</i>	fungi	Sensitive
<i>Draba carnosula</i>	vascular plant	Sensitive
<i>Epilobium oregonum</i>	vascular plant	Sensitive
<i>Eriogonum hirtellum</i>	vascular plant	Sensitive
<i>Erythronium hendersonii</i>	vascular plant	Sensitive
<i>Gentiana setigera</i>	vascular plant	Sensitive
<i>Lewisia oppositifolia</i>	vascular plant	Sensitive
<i>Packera hesperia</i>	vascular plant	Sensitive
<i>Pedicularis howellii</i>	vascular plant	Sensitive
<i>Phaeocollybia olivacea</i>	fungi	Sensitive
<i>Prosartes parvifolia</i>	vascular plant	Sensitive
<i>Ramalina thrausta</i>	lichen	Sensitive
<i>Silene serpentinicola</i>	vascular plant	Sensitive
<i>Sowerbyella rhenana</i>	fungi	Sensitive
<i>Streptanthus howellii</i>	vascular plant	Sensitive
<i>Tauschia howellii</i>	vascular plant	Sensitive
<i>Tricholomopsis fulvescens</i>	fungi	Sensitive
<i>Viola lanceolata</i>	vascular plant	Sensitive

### Federally Listed Endangered Species

Project effects to the federally listed Endangered McDonald rockcress (*Arabis mcdonaldiana*) are addressed in a separate biological assessment.

### Pacific Southwest Region (Region 5) Forest Service Sensitive Botanical Species

Region 5 Forest Service Sensitive botanical species, (Sensitive plant species) are those eligible for listing under the Endangered Species Act, or whose viability is of concern. These are protected by USDA Forest Service regulations and manual direction. The Region 5 Sensitive Plant List was updated and signed July 3, 2013 by the Regional Forester. This new list supersedes earlier lists and is the one used for this analysis.

Sensitive botanical species considered for this analysis are those that the proposed action potentially affects (FSM 2672.42). The following Sensitive bryophyte, lichen and fungi species were not included in this analysis because critical habitat components, host trees and canopy cover will not be affected by the proposed actions. These species include *Boletus pulcherrimus*, *Buxbaumia viridis*, *Calicium adpersum*, *Cudonia monticola*, *Dendrocollybia racemosa*, *Fissidens pauperculus*, *Leptogium siskiyouensis*, *Mielichhoferia elongate*, *Otidea smithii*, *Peltigera gowardii*, *Phaeocollybia olivaceae*, *Ramalina thrausta*, *Sulcaria badia*, and *Tricholomopsis fulvescens*. The following Sensitive botanical species will not be affected by the proposed actions because their range does not extend onto the project area nor have botanical surveys found them to be present within the project area. These species include *Cypripedium montanum*, *Epilobium oregonum*, *Erigeron maniopotamicus*, *Eriogonum hirtellum*, *Erythronium hendersonii*, *Eucephalus vialis*, *Draba carnosula*, *Illiamna latibracteata*, *Lewisia kelloggii ssp. kelloggii*, *Pedicularis howellii*, *Sanicula tracyi*, and *Tauschia howellii*. The nearest location for *Cypripedium montanum*, *Lewisia kelloggii ssp. kelloggii* and *Thermopsis*

*robusta* is over 20 miles south in Humboldt County on the Orleans Ranger District. *Epilobium oreganum*, *Eriogonum hirtellum*, *Draba carnosula*, *Eucephalus vialis*, *Iliamna latibracteata*, *Pedicularis howellii*, *Smilax jamesii* and *Tauschia howellii* are known to occur several miles east of the project area on the Siskiyou and Klamath National Forests. The nearest location of *Tauschia howellii* is over 4 miles east near Prescott Mountain in the Siskiyou Wilderness. The closest known sites for *Lupinus constancei*, *Minuartia decumbens* and *Aniscocarpus scabridus* are over 80 miles south of the project area in or adjacent to the Lassics Botanical Area in Trinity County. The closest known sites for *Erigeron maniopotamicus*, *Frasera umquaensis*, *Sanicula tracyi*, *Sedum obtusatum ssp. paradisum* and *Streptanthus oblanceolatus* are in Trinity County, a substantial distance from the project area. The closest known site for *Bensoniella oregana* is in Humboldt county over 45 miles from the project area. *Tracyina rostrata* is not known to occur on Six Rivers National Forest and known sites are located south of the Forest.

### Sensitive Plant Species Identified for Further Analysis

Sensitive plant species considered in the project area that have the potential to be affected by the proposed actions are displayed in Table 3.

Table 3 – Sensitive plant species identified for further analysis

Common Name	Scientific Name	Status
Howell's jewelflower	<i>Streptanthus howellii</i>	Region 5 Sensitive
Koehler's rockcress	<i>Boechera koeleri</i>	Region 5 Sensitive
Clustered ladys-slipper	<i>Cypripedium fasciculatum</i>	Region 5 Sensitive
Opposite-leaved lewisia	<i>Lewisia oppositifolia</i>	Region 5 Sensitive
Serpentine Indian pink	<i>Silene serpentinicola</i>	Region 5 Sensitive
Siskiyou bells	<i>Prosartes parvifolia</i>	Region 5 Sensitive
Mendocino gentian	<i>Gentiana setigera</i>	Region 5 Sensitive
Western bog violet	<i>Viola primulifolia ssp. occidentalis</i>	Region 5 Sensitive
Western ragwort	<i>Packera Hesperia</i>	Region 5 Sensitive

A total of 25.9 miles of routes were surveyed from May to July 2006 for those species shown in Table 5, except for the Siskiyou bells which was not Sensitive at the time. From April to June 2012 surveys for the Siskiyou bells, the Mendocino gentian and the Western bog violet were performed. A majority of the UARs surveyed are associated with old mining roads within the North Fork and main stem Smith River watersheds on the Smith River NRA and located on the Gasquet, High Divide, High Plateau, and Hiouchi 7.5 minute USGS quads. In addition to surveys of UAR surfaces, surveys were also conducted on their edges out to 100 feet on either side if suitable habitat was present.

Sensitive plant species not found to be present or not affected by the proposed action are herein removed from further analysis. These species include Koehler's rockcress, clustered ladys-slipper, Siskiyou bells, and western ragwort. The following Sensitive plant species were found to be present within 100 feet of UARs. The number of

occurrences and number of plants are for the area of analysis. Table 4 displays those botanical plant species carried forward in the analysis.

Table 4 – Sensitive plant species present on or within 100 feet of UARs on Smith River NRA

Common Name	Scientific Name	Habitat
Howell's jewelflower	<i>Streptanthus howellii</i>	Seasonally Dry Serpentine
Opposite-leaved lewisia	<i>Lewisia oppositifolia</i>	Seasonally Dry Serpentine
Serpentine Indian pink	<i>Silene serpentinicola</i>	Seasonally Dry Serpentine
Mendocino gentian	<i>Gentiana setigera</i>	Serpentine Wetland
Western bog violet	<i>Viola primulifolia</i> ssp. <i>occidentalis</i>	Serpentine Wetland

## Species Accounts

**Howell's jewelflower** (*Streptanthus howellii*) Shown as STHO in tables.

Howell's jewelflower (species code = STHO) is a rare herbaceous perennial forb that is considered to be a strict serpentine endemic (Stafford 2005), only found on serpentine substrate. It is often found where large rocks and boulders provide protection and along roads surrounded by dense shrub cover. It is often observed in disturbed niches which may be due to such factors as improved conditions for seed germination, the reduction in competition from more aggressive plant species, passive avoidance of agents of disturbance, or morphological traits that afford some protection from negative effects occurring on route surfaces. Howell's jewelflower is confined to dry, brushy serpentine exposures on the Josephine ophiolite in the Siskiyou Mountains of Josephine and Curry counties, Oregon and Del Norte County in California. The California Native Plant Society rates it as List 1B.2 - Rare, threatened, or endangered in California and elsewhere. It is a Forest Service Region 5 and Region 6 Sensitive species and is included on the BLM Oregon State Office Sensitive Species List.

There are 33 element occurrences<sup>1</sup> (hence forth referred to as occurrences) known to exist in Curry and Josephine Counties, Oregon (OHNPDB 2013). Of the occurrences known from Oregon, 10 have not been observed in over 20 years and 15 have not been observed in at least 10 years. Twelve have fewer than 12 ramets<sup>2</sup>, 22 have a "poor estimated viability" rating, 4 lack population counts and 5 have "good" to excellent estimated viability in the Oregon Natural Heritage Program database.

Howell's jewelflower has been assigned a global conservation status rank of G2 (Imperiled) with a high risk of extinction due to its very restricted range, very few

<sup>1</sup> The biologically neutral term "element occurrence," as defined by the state Natural Heritage Program, denotes geographically distinguishable sites (within ¼ mile of each other) for rare species (NatureServe 2006).

<sup>2</sup> Ramets represent the number of vegetative units or stems produced by a plant. For multi-stemmed plants that branch below ground they represent what is visible to the observer.

occurrences, small number of individuals, intrinsic vulnerability, and environmental specificity. Federal land management agencies (especially the Forest Service and BLM) have placed increasing emphasis on Nature Serve ranks to prioritize their conservation and planning efforts.

Survey results regarding the number of plants found either on or adjacent to the travel surface of UARs proposed for designation as motorized trails are addressed in each alternative. The above ground portion of Howell's jewelflower arises from an underground tuber like root which can give rise to more than one above ground stem making a count of the actual number of individual plants (genets) impossible without digging each plant up. Excavation of one plant of Howell's jewelflower revealed that it produced 3 stems from a single underground tuber. Hence an individual plant of Howell's jewelflower may produce 1 to 3 above ground shoots at a minimum. Census data displayed under each alternative records the number of shoots observed and are recorded as number of plants.

Surveys revealed that a notable percentage (98%) of Howell's jewelflower plants were found within 30 feet of UARs (645 plants) compared to those found from 30 to 100 feet of UARs (10 plants). The high number of Howell's jewelflower plants found on or adjacent to routes exhibiting signs of disturbance from motorized use can be attributed to several factors noted below, keeping in mind that this applies to the low level of use currently observed.

Howell's jewelflower stores resources in its tuber like root system. This ability to store resources can be understood as a precaution against variability in the growing conditions of plants (Larcher 1995). Storage promotes rapid development of productive structures after inactive periods in seasonal environments and it enables plants to recover from damage in frequently disturbed habitats. The benefits of storage result from the potential to quickly rebuild parts of the plant body (leaves, stems, and roots) that are essential for future resource capture and biomass production (Suzuki and Stuefer 1999).

The ability of mature plants of Howell's jewelflower to produce multiple above ground stems (ramets) can buffer plants against unfavorable consequences. The risk of plant mortality is spread among a number of stems, each capable of suffering independent mortality. If one stem out of 3 is crushed a plant has greater odds of surviving than a plant with a single stem crushed to the point where photosynthesis and nutrient transport cease. Odds for survival are improved where more than one stem has to be crushed to avoid significant damage leading to loss of an individual plant. The loss of some above ground stems to crushing or grinding would set the plant back, perhaps preventing flowering the following season, but it would not necessarily lead to the loss of the individual.

A second explanation for the survival Howell's jewelflower on or adjacent to the disturbed surfaces of UARs is the fact that over-wintering meristematic tissue arises from the crown of an underground root which is buried under a protective layer of soil. Plant mortality depends on the amount of meristematic tissues killed (Brown et. al. 2000). The fact that this species' meristematic tissue is generated 3 to 5 inches below ground level affords some protection from direct negative effects occurring on the surface.

The low number, 2%, of Howell's jewelflower found beyond 30 feet and up to 100 feet from UARs, the zone surveyed, suggests that Howell's jewelflower is a poor competitor. In the absence of motorized disturbance on UARs the surrounding shrub species, many with re-sprouting capability and greater net photosynthetic rate, would gain a size and competitive advantage. Disturbances, on the other hand, favor less competitive species

and thus allow the coexistence of species with different competitive abilities. The low level of use on UARs may provide some benefit to Howell's jewelflower due to the reduction in competition from species that are less tolerant of disturbance in the form of motorized use. Once shrubs were cleared from the UARs and a low level of use was initiated the ability of shrubs to recolonize was compromised by slow growth rate associated with low soil fertility in the serpentine environment combined with the inherent vulnerability of above ground meristem tissue to mortality via motorized surface disturbance.

Howell's jewelflower gained competitive advantage under the low level of use through its ability to store resources below ground and quickly rebuild parts of the plant body that are essential for future resource capture and biomass production. In this regard it is more appropriate to describe Howell's jewelflower as disturbance resistant rather than labeling it as disturbance tolerant. Modeling of disturbance-mediated competition between perennial plants along a resource supply gradient has predicted that selection favoring disturbance resistance is greater in species that sacrifice high maximum net photosynthetic rates in favor of increased storage than in species that sacrifice storage in favor of increased maximum net photosynthetic rates (Brewer 2011).

### **Opposite-leaved lewisia (*Lewisia oppositifolia*)** Shown as LEOP in tables

Opposite-leaved lewisia (species code = LEOP) is a rare to locally uncommon herbaceous perennial forb known only from southwestern Oregon and northwestern California. It occurs in barren, gravelly to cobbly soils of serpentine origin in shallow depressions and benches that tend to remain saturated or puddled into spring. The California Native Plant Society rates it as List 2.2 - Rare, threatened, or endangered in California but more common elsewhere. It is a Forest Service Pacific Southwest Region (Region 5) Sensitive botanical species. It is not on the Pacific Northwest Region's (Region 6) sensitive species list. There are at least 29 element occurrences in Curry, Jackson and Josephine Counties, Oregon according to the Oregon Natural Heritage Program (ONHP) which stopped tracking this species in 1989 when it was removed from ONHP List 4 (Vrilakas 2005). Because this species is not Sensitive in Region 6 surveys are lacking and detailed data is not available for occurrences in Oregon. It has been assigned a global conservation status rank of G4; apparently secure but factors exist to cause some concern. These factors include intrinsic vulnerability and environmental specificity.

Opposite-leaved lewisia is a tap rooted perennial that reproduces entirely by seed. It occurs primarily in open habitat where canopy cover is often minimal to zero, and competition from other vegetation is low. Plant blooming coincides with seasonal moisture in the spring, and usually occurs from late April to early May. In times of drought, plants remain dormant and quickly senesce following a decrease in water availability. By summer, areas with *L. oppositifolia* that were moist or saturated are dried, and the plant is no longer detectable. The root crown including the caudex (which is a thick, sometimes woody, stem of a perennial that is at or beneath the ground level) of the opposite-leaved lewisia extends about two inches below the soil surface, a depth which may afford some protection.

Survey results regarding the number of opposite-leaved lewisia found either on or adjacent to the travel surface of UARs proposed for designation as motorized trails are addressed in each alternative. Opposite-leaved lewisia initiates new spring growth from enlarged caudices which are short almost vertical stems located at or just below ground level (Hickman 1993). Because of the shallow location of the over wintering buds it is

more vulnerable to the grinding effects of tires than species like Howell's jewelflower or the serpentine Indian pink which bear their over wintering buds at greater depths. Even so, 62% of the plants found were within 30 feet of UARs compared to 38% found from 30 to 100 feet of UARs. Opposite-leaved lewisia may also be prone to adverse effects from dewatering. It occurs in shallow depressions and benches that tend to remain saturated or puddled into spring. Actions that change micro-topography (e.g. wheel ruts) can dry out occupied sites and make them no longer habitable.

### **Serpentine Indian pink (*Silene serpentinicola*)** Shown as SISE10 in tables

The serpentine Indian pink (species code = SISE10) is a rare herbaceous perennial forb. It is found primarily in California where it is limited to serpentine openings in Del Norte County. A population was recently found in Oregon extending about 100 meters north of the state line into Oregon along the most northern edge of the broad and flat bench known as Pine Flat Mountain (Emerson 2013). The serpentine Indian pink occurs in dry, gravelly to cobbly soils of serpentine origin on flat cross slopes. The serpentine Indian pink is a tap rooted, herbaceous perennial with an underground tuber which branches beneath the soil surface. From these branches shoots develop. Reproductive plants flower between mid-June to mid-July and may flower later into August depending on the season. Based upon field observations, it appears that flowering at a given population varies from year to year. Dormancy has been observed in other species of *Silene* (Lesica 1999). The combination of habitat (open settings, often disturbed, rocky/little herbaceous), development of underground branches that further develop above-ground shoots, the reproductive period during the summer, and possibly periods of dormancy indicate that serpentine Indian pink ecology, distribution and persistence in the landscape is associated with disturbance, likely fire.

Little is known about the biology of this species although it appears to be early successional in nature with a preference for disturbed soils found on or adjacent to roads. The serpentine Indian pinks high percentage of plants, 95% (9518 plants) were found within 30 feet of UARs compared to 5% found from 30 to 100 feet of UARs indicating that disturbance plays a role in its persistence. It is often observed in disturbed niches, which is likely due to the same factors that are noted above for Howell's jewelflower. These include poor competitive ability, meristematic tissue that is generated 3 to 5 inches below ground level, reduction in competition from species that are less tolerant of motorized disturbance, and its ability to store resources below ground and quickly rebuild parts of the plant body that are essential for future resource capture and biomass production.

The California Native Plant Society rates it as List 1B.2 - rare, threatened, or endangered in California and elsewhere. It is a Forest Service Pacific Southwest Region (Region 5) Sensitive species. It is a recently described species (Nelson and Nelson 2004). Because it is recently described surveys are lacking and detailed information is not available for range wide occurrence data. Data provided here on number of plants is largely a result of surveys performed for the proposed action. The serpentine Indian pink has been assigned a global conservation status rank of G2 (Imperiled) with a high risk of extinction due to its very restricted range, very few known occurrences, intrinsic vulnerability, and environmental specificity.

Like Howell's jewelflower, serpentine Indian pink produces an underground tuber that gives rise to one to several shoots making a count of actual plants impossible without digging all plants up. Excavation of one plant of serpentine Indian pink revealed that it produced 5 above ground shoots. Hence an individual plant may produce 1 to 5 shoots at

a minimum. Census data displayed herein records the number of shoots observed and are recorded as plants. Survey results regarding the number of serpentine Indian pink plants found either on or adjacent to the travel surface of inventoried unauthorized routes proposed for designation as motorized trails are addressed in each alternative.

**Mendocino gentian** (*Gentiana setigera*) Shown as GESE2 in tables

The Mendocino gentian (species code = GESE2) is an herbaceous perennial forb that spreads by creeping rhizomes. It is known primarily from southwestern Oregon and northwestern California with one disjunct occurrence occurring on serpentines in Mendocino County. Most occurrences are relatively small. They occur in wetland habitats isolated by drier unsuitable upland habitat. It is most abundant in portions of wetlands with low shrub and tree cover, high graminoid cover, and fine-textured soils with moderate moisture content (Frost et. al. 2004). The California Native Plant Society rates it as List 1B.2 - rare, threatened, or endangered in California and elsewhere. It has been assigned a global conservation status rank of G2 (Imperiled) with a high risk of extinction due to its very restricted range, very few known occurrences, intrinsic vulnerability, and environmental specificity. *Gentiana setigera* is more abundant in Oregon than in California where there is greater concern for its viability. There are 49 element occurrences in Curry and Josephine Counties, Oregon and 5 occurrences in Del Norte County, California and one occurrence in Mendocino County, California. The 5 California occurrences in Del Norte County are all located on Six Rivers National Forest on the Smith River National Recreation Area and support approximately 3321 plants. Except for one occurrence growing in a roadside ditch on 17N49.7 no plants were found on other routes proposed for designation and plants that are within 30 feet of UARs are protected by landscape features that prevent motorized access.

**Western bog violet** (*Viola primulifolia* ssp. *Occidentalis*) Shown as VIPRO2 in tables

The western bog violet (species code = VIPRO2) is an herbaceous perennial forb that spreads by creeping rhizomes. It is associated with flowing water, steep slopes, and coarse textured soils, under open canopy conditions with high rock and soil cover (Frost et. al. 2004). It is known only from southwestern Oregon and northwestern California. The California Native Plant Society rates it as List 1B.2 - Rare, threatened, or endangered in California and elsewhere. It has been assigned a global conservation status rank of G5T2 (Imperiled) with a high risk of extinction due to its very restricted range, very few known occurrences, intrinsic vulnerability, and environmental specificity. There are 28 element occurrences in Curry and Josephine Counties, Oregon and 20 occurrences in Del Norte. All of the occurrences on the Forest are within the Smith Rivers National Recreation Area.

Like Howell's jewelflower, the serpentine Indian pink, and the Mendocino gentian, the western bog violet produces an underground stem that gives rise to one to many shoots making a count of actual plants impossible without digging all plants up. For multi-stemmed plants that branch below ground they represent what is visible to the observer. The number of stems produced by an individual plant is not known although it is considerably higher than other species noted herein and accounts for the high number of plants recorded. What is important to note is that the census data displayed herein records the number of shoots observed that are recorded as the number of individual plants (30,148). Plants adjacent to motorized routes are protected by landscape features that prevent motorized access in all but one location that occurs in a roadside ditch along 17N49.7 near the intersection of 17N49 which is proposed for designation as a motorized

trail. Although it is unlikely that vehicles would intentionally drive into the ditch, this location will be inventoried under the Adaptive Management Mitigation plan.

Some of the occurrences of the Mendocino gentian and the western bog violet in the project area are proposed for designation as essential California darlingtonia wetland areas in the draft conservation strategy for 5 rare serpentine wetland species which includes the Mendocino gentian and the western bog violet. Although roadside ditches and steep topography form a barrier to cross country travel through these wetlands, motorized recreation remains a threat.

Both the Mendocino gentian and the western bog violet are rhizomatous and rely on clonal growth for survival and dispersal. Clonal species vary considerably in the extent to which potentially independent offspring remain connected to parents or siblings through such structures as rhizomes and stolons. Connections may senesce rapidly or persist for many years. The presence of functional connections can affect competitive ability or determine the ability of individual shoots or modules to survive stress or injury serving as a precaution against variability in the conditions under which these plants are growing.

## **VI. Effects of the Proposed Project**

### *Indirect Effects*

Indirect effects are defined as occurring 30 to 100 feet from the center of designated UARs. Dust raised by vehicle traffic, under certain conditions, can result in indirect effects. Dust coating of the foliage can disrupt critical biological processes such as photosynthesis, respiration and transpiration; thereby suppressing plant growth and vigor and in some cases altering community structure (Trombulak and Frissell 2000). Within the project area dust accumulation has not been observed as a concern where UARs coincide with sensitive plant occurrences. Considering the low level of use and the extent of rainfall in the project area it is unlikely that dust could accumulate to an extent where it would suppress growth or vigor at a distance of 30 feet or greater from the center of UARs. Therefore there are no indirect effects associated with dust.

Another indirect effect noted in the literature is the displacement of native plants by non-native species. Disturbance caused by OHV use can lead to the eventual replacement of native plant species with non-native species that are highly adapted to frequent disturbances and altered soil conditions. Many invasive species have life forms that are adapted to persist in disturbed habitats such as roadsides and areas with frequent vehicle use. Furthermore, OHVs can serve as vectors of invasive plant seed (Von Der Lippe and Kowarik 2007). However, negative impacts from non-native plant species to sensitive plant species has not been observed in association with the UARs surveyed likely due to the fact that the sensitive plant species in the project area are serpentine endemics and environmental condition of serpentine soils may have an exclusionary effect on invasive plant establishment (Harrison et. al. 2006). Therefore, there are no indirect effects to Federally listed or Forest Service Sensitive plant species as a result of adding UARs to the NFTS and they will not be addressed further in this document.

### *Direct Effects*

Direct effects are those that occur within 30 feet of the center of inventoried UARs proposed for designation to the NFTS and that fall below the management response

threshold (see Table 1). The management response threshold will trigger actions designed to protect plants and occurrences from direct threats which occur above this threshold.

### 1. Direct effects of adding UARs as roads to the NFTS.

There are no known Sensitive plant species associated with UARs being added as roads to the NFTS therefore there are no direct effects resulting from this action.

### 2. Direct effects of the designation of UARs as motorized trails to the NFTS.

Direct Effects

Table 5 displays the number of plants (referred to as individuals but numbers herein refer to the number of ramets or above ground stems) and the occurrences of each of the 5 sensitive species within 30 feet of UARs proposed for addition to the NFTS. These species are the opposite-leaved lewisia (LEOP), the serpentine Indian pink (SISE10), Howells jewelflower (STHO), and the western bog violet (VIPRO2).

Table 5 - Sensitive plants within 30 feet of Proposed Motorized Trails Alternative 6

Road_Route	Miles	OCC_ID	LEOP	SISE10	STHO	VIPRO2
17N49.101	1.17	SISE10_007		300		
17N49.101	1.17	SISE10_009		300		
17N49.102	0.87	SISE10_008		1000		
17N49.104	3.82	SISE10_012		200		
17N49.104	3.82	SISE10_016		650		
17N49.104	3.82	SISE10_018		616		
17N49.104	3.82	STHO_017			120	
17N49.107	0.64	STHO_017			2	
17N49.108	0.31	STHO_017			2	
17N49.11	2.55	SISE10_014		517		
17N49.11	1.94	SISE10_014		147		
17N49.11	2.55	STHO_017			16	
17N49.11	1.94	STHO_017			19	
17N49.13	0.3	SISE10_019		45		
17N49.14	0.54	STHO_017			9	
17N49.15	0.62	STHO_017			1	
17N49.4	0.75	SISE10_006		750		
17N49.7	2.15	VIPRO2_005				500
17N49.7	2.15	VIPRO2_007				100
17N49.7	2.15	VIPRO2_008				100
17N49.7	2.15	SISE10_013		400		
17N49.7	0.29	SISE10_015		800		
17N49.7A	0.82	SISE10_017		600		
17N49.8	0.39	SISE10_016		58		
17N49.8	0.39	STHO_017			13	

Road_Route	Miles	OCC_ID	LEOP	SISE10	STHO	VIPRO2
18N51.100	1.45	LEOP_014	27			
305.109	2.43	LEOP_011	29			
305.109	2.43	LEOP_012	42			
305.109	2.43	LEOP_013	162			
305.109	2.43	SISE10_027		295		
305.118	0.8	STHO_039			7	
305.121B	1.03	STHO_027			6	
305.125	1.44	STHO_016			1	
		<b>Totals</b>	<b>260</b>	<b>6678</b>	<b>196</b>	<b>700</b>

Negative direct effects resulting from motorized use includes damage and death to sensitive vascular plants that fall below the management response threshold within 30 feet of UARs proposed for addition to the NFTS. These negative effects are associated with reductions in photosynthetic capacity, poor reproduction, increases in bare ground, diminished litter cover, and a reduction in the overall cover and frequency of plant species. These effects are of particular concern with rare plant species which are typically represented by a limited number of populations and/or individuals due to their potential to affect the long term viability of rare plant populations by increasing mortality and decreasing the vigor and productivity of populations. Of the 7,839 plants shown in Table 5, a total of 1,153 Sensitive plants fall below the management response threshold and have the potential to be negatively affected by the proposed action.

It is important to point out that the proposed action concerns the designation of existing inventoried unauthorized routes that have experienced motorized recreation use and the negative effects to plants noted above have occurred and are ongoing. As a result of the use these routes have experienced the plant cover is low and bare ground cover is high. Plant species that are not tolerant of vehicular use that may have been present on routes prior to use are now present in lower numbers or no longer present at all. Sensitive plants such as Howell’s jewelflower and the serpentine Indian pink that are present in relatively high numbers within 30 feet compared to 30 to 100 feet (see Table 6) may exhibit resistance to disturbance (for reasons noted earlier in this document) related to the low level of motorized use.

Table 6

	Howell’s jewelflower	serpentine Indian pink
Within 30 feet UAR	190	6678
30 to 100 feet of UAR	8	306

**3. Direct and indirect effects of upgrading selected NFTS roads from closed (ML 1) to open (ML 2).**

National Forest Transportation System roads are not considered suitable habitat for the rare plant species analyzed due to their altered engineered surfaces, nor are the Sensitive plant species carried forward in the analysis known to occur on these surfaces.

**4. Direct and indirect effects of downgrading selected NFTS roads from open (ML 2) to closed (ML 1).**

National Forest Transportation System roads are not considered suitable habitat for the rare plant species analyzed due to their altered engineered surfaces, nor are the Sensitive plant species carried forward in the analysis known to occur on these surfaces.

**5. Direct and indirect effects of downgrading selected NFTS roads from open (ML 3) to mixed use (ML 2).**

National Forest Transportation System roads are not considered suitable habitat for the rare plant species analyzed due to their altered engineered surfaces, nor are the Sensitive plant species carried forward in the analysis known to occur on these surfaces.

**6. Direct and indirect effects of decommissioning selected NFTS roads to non-system (closed).**

Although no Sensitive plant species occur on NFTS roads proposed for decommissioning, roads that are present on Sensitive plant habitat (serpentine substrate) will benefit from this action, restoring the habitat to a condition suitable for the species. Approximately 50 acres of Sensitive plant habitat will benefit from this action.

**7. Direct and indirect effects of converting selected NFTS roads to motorized trails.**

National Forest Transportation System roads are not considered suitable habitat for the rare plant species analyzed due to their altered engineered surfaces, nor are the Sensitive plant species carried forward in the analysis known to occur on these surfaces.

**8. Direct and indirect effects of designation of parking areas on 17N49.**

Parking areas on 17N49 proposed under Alternative 6 are not in the vicinity of any known Sensitive plant species or their occurrences therefore there are not direct or indirect effects.

**9. Direct and indirect effects of restoring hydrological function on selected UARS.**

Restoring hydrological function concerns insuring that route surfaces are not channeling water increasing its erosive force. This is beneficial to plants growing on or adjacent to route surfaces as channeled water can undermine plants and contribute to injury or loss. Approximately 486 acres of Sensitive plant habitat (serpentine substrate) will benefit from this action provided that a botanist review the final restoration plan to insure that Sensitive plant species benefit from and are not adversely affected by routes proposed for restoration of drainage patterns.

**10. Direct and indirect effects of barricading UARs not added to the NFTS.**

Table 6 displays, by route, the number of plants and the occurrences of each of the 5 Sensitive plant species within 100 feet of inventoried unauthorized routes proposed for designating to the NFTS in Alternative 6. These species are the Mendocino gentian

(GESE2), the opposite-leaved lewisia (LEOP), the serpentine Indian pink (SISE10), Howell's jewelflower (STHO) and the western bog violet (VIPRO2).

Table 7 - Sensitive Plants Barricaded under Alternative 6

Road_Route	Miles	OCC_ID	GESE2	LEOP	SISE10	STHO	VIPRO2
17N07.2	0.51	LEOP_002		93			
17N49.100	3.88	ERPE6_018					
17N49.100	3.88	SISE10_020			1139		
17N49.100	3.88	STHO_014				2	
17N49.100	3.88	STHO_017				50	
17N49.103	0.26	SISE10_009			225		
17N49.104	0.86	ERPE6_008					
17N49.104	0.86	STHO_017				5	
17N49.105	1.43	GESE2_004	175				
17N49.105	1.43	SISE10_016			570		
17N49.105	1.43	SISE10_018			294		
17N49.105	1.43	STHO_017				6	
17N49.105	1.43	VIPRO2_010					7500
17N49.105A	0.12	SISE10_016			310		
17N49.105A	0.12	STHO_017				1	
17N49.106	0.32	STHO_017				4	
17N49.11N	0.23	STHO_002				2	
17N49.12	2.1	ERPE6_018					
17N49.12	2.1	SISE10_017			302		
17N49.12	2.1	STHO_010				50	
17N49.7	0.29	SISE10_015			800		
305.100	0.57	STHO_024				29	
305.107	1.25	ERPE6_048					
305.107	1.25	SISE10_029			200		
305.107	1.25	STHO_047				14	
305.109A	1.02	LEOP_011		44			
305.109A	1.02	STHO_041				155	
305.115	1.74	ARMA33_039					
305.115	1.74	ARMA33_027					
305.115	1.74	ERPE6_045					
305.118	0.8	ERPE6_037					
305.126	1.56	STHO_009				44	
305.126	1.56	STHO_013				1	
305.128	0.7	ERPE6_030					
305.128	0.7	STHO_037				3	
305.128	0.7	STHO_039				4	
305.131	0.09	STHO_033				52	
<b>Total Number of Plants</b>			<b>175</b>	<b>137</b>	<b>3840</b>	<b>422</b>	<b>7500</b>
<b>Total Number of Occurrences</b>			<b>2</b>	<b>2</b>	<b>7</b>	<b>12</b>	<b>1</b>

Direct and indirect effects of barricading UARs not added to the NFTS are beneficial. Barricading prevents motorized use thereby preventing damage and death to Sensitive plant species resulting from reductions in photosynthetic capacity, poor reproduction, increases in bare ground, diminished litter cover, and a reduction in the overall cover and frequency of plant species. A total of 12,256 Sensitive plants will benefit from barricading UARs not added to the NFTS.

Table 8 - Direct Effects Alternative 6

Indicator	Direct and Indirect Effects
1. Number of plants of federally listed endangered and sensitive species affected by designating UARs as motorized trails	1,153
2. Number of plants of federally listed endangered and sensitive species affected by designating parking sites along 17N49	0
3. Acres of road decommissioned in federally listed endangered and sensitive species serpentine habitat	50
4. Acres of federally listed endangered and sensitive species sensitive plant serpentine habitat proposed for restoration of hydrologic function	486
5a. Number of plants of federally listed endangered and sensitive species affected by barricading UARs not designated on the NFTS	12,256
5b. Number of occurrences of federally listed endangered and sensitive species affected by barricading UARs not designated on the NFTS	26

### Cumulative Effects

The cumulative effects analysis herein will not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. Focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. By looking at current conditions, we are likely to capture the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. For these reasons, the analysis of past actions is based on current environmental conditions.

The cumulative effects of management activities such as timber harvesting, road building, mining, and fire suppression has resulted in many upland habitats and riparian areas with altered function and processes. However, the future options of timber harvest, road construction, and mining were largely determined through the passage of the 1990 Smith River NRA Act, as well as through designation much of the timber management zone as Late-successional Reserves under the goals of the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USFS/BLM 1994). The entire Smith basin is a Key Watershed. The NRA Act legislated management direction through eight management zones and Streamside Protection Zones. Streamside protection legislated in the NRA Act meets and, in some instances surpasses, the goals of Riparian Reserves in the Aquatic Conservation Strategy. The trend for upland and riparian habitats on the NRA is towards recovery. Since the 1990 NRA Act, timber harvest on the NRA has been

geared towards restoration of late-successional characteristics and habitat development (thinning in younger stands). Furthermore, potential habitat within any project area is surveyed for Sensitive plant species. If detected and it is determined that the proposed action may affect the plant or its habitat, buffers are established that preclude all activities or those that may impact the plant. For these reasons it is anticipated that future timber harvest, road construction and mining will be substantially limited and not contribute toward cumulative effects.

An extensive cumulative effects project list was prepared for this analysis in July of 2015 and appears elsewhere in the EIS. Most occurrences of Sensitive plant species analyzed herein are not affected by actions resulting from these projects. The projects associated with trail construction, relocation and maintenance, land acquisition, bridge replacement and seismic retrofit, storm damage and cable mesh drape on highway 101 have no effect on plants analyzed and hence there are no cumulative effects. Roadside fuel breaks are installed around communities to reduce wildfire risks. These areas are not considered to be highly suitable for Sensitive plant species. Other roadside fuel breaks occurring in potential habitat are surveyed and project design features are established to preclude or significantly reduce effects.

Projects that are designed to reduce competition by removing invasive non-native plant species serve to benefit rare species analyzed. The project which barricaded the road to High Plateau within the North Fork Smith Special Interest provides protection to occurrences of the Sensitive species (the Mendocino gentian, the opposite-leaved lewisia, the serpentine Indian pink, and Howell's jewelflower) which occur on High Plateau. Projects that include shaded fuel breaks, roadside sanitation, community protection and understory burns that are designed to reduce fuel accumulation also potentially benefit Sensitive species affected by this project. Vegetative succession and the resultant increased cover have been identified as possible concerns (Carothers 2007) for opposite-leaved lewisia and the serpentine Indian pink in that increasing cover would change habitat suitability for the species; habitat characterized by low canopy and low shrub cover. The significance of concern over vegetation succession in ultramafic settings due to fire suppression is not straightforward. Suppression may not be as influential in ultramafic settings as it has been in forests or shrublands. In the summer and fall of 2002, the Biscuit Wildfire burned areas of the North Fork Smith River watershed on Six Rivers and in the Illinois Valley on the Siskiyou National Forest. There are no quantitative data for populations corresponding to areas of high intensity fire prior to the fire. Monitoring in 2005 indicated that known sites of opposite-leaved lewisia and the serpentine Indian pink within the fire perimeter were extant after the wildfire.

Present and future projects include implementation of Coon Mountain Meadow Restoration Project and Gordon Hill Vegetation Management Project. For the former, monitoring of burning effects to the opposite leaved lewisia over the past 5 years has not shown any negative effects to lewisia populations there. The opposite leaved-lewisia is afforded some protection from fire due to its early seed set and the fact that it occurs in area with sparse vegetation. Monitoring of project effects on the serpentine Indian pink associated with the Gordon Hill Vegetation Management Project has not found detrimental effects. For these reasons it is not anticipated that either the Coon Mountain Meadow Restoration or the Gordon Hill Vegetation Management Project will contribute cumulative effects to the species.

For reasons noted above and with the requirements stipulated in the Botanical Resources Adaptive Management Strategy no present or future actions are likely to result in cumulative effects that would lead to federal listing or loss of viability of the Mendocino

gentian, the opposite leaved lewisia, the serpentine Indian pink, Howell's jewelflower, or the western bog violet for Alternative 6.

## VII. Determination

The Thresholds of Concern and Management Actions describe a threshold by which species persistence and/or decline can be assessed and responded to through management actions to ensure that a loss of viability or trend toward federal listing for sensitive species is not resultant of the actions considered under this project. With the implementation of the baseline data collection and subsequent monitoring designed to evaluate the need for and implement a management response to avoid a loss of viability, it is my determination that actions proposed under Alternative 6 in the *Smith River National Recreation Area Restoration and Motorized Travel Management Project* may affect individuals but they are not likely to result in a trend toward federal listing or loss of viability of the Mendocino gentian (*Gentiana setigera*), the opposite-leaved lewisia (*Lewisia oppositifolia*), the serpentine Indian pink (*Silene serpentinicola*), Howell's jewelflower (*Streptanthus howellii*), or the western bog violet (*Viola primulifolia ssp. occidentalis*).

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