

3.8 Soil Resource

3.8.1 Introduction

A healthy and functional watershed relies on an equilibrium, or balance, in the soil productivity, soil quality, water quantity and water quality. The soil resource provides many essential functions for NFS lands. It sustains plant growth that provides forage, fiber, wildlife habitat and watershed protection. It absorbs precipitation, stores water for plant growth and gradually releases surplus water which attenuates runoff rates. It sustains microorganisms which recycle nutrients for continued plant growth. The National Forest Management Act of 1976 and other acts recognized the fundamental need to protect and, where appropriate, improve the quality of soil.

Protection of the soil resource is an important part of the mission of the Forest Service. Management activities on NFS lands must be planned and implemented to protect soil quality and the hydrologic functions of forest watersheds. The use of roads, trails and other areas on National Forests for public operation of motor vehicles has potential to affect the soil resource through interception of runoff, compaction of soils and detachment of sediment (Foltz, 2006). Management decisions to eliminate cross-county motorized travel, add new routes and areas to the NFTS and make changes to the existing NFTS must consider effects on soils and watersheds.

Analysis Framework: Statute, Regulation, LRMP and Other Direction

Direction relevant to the alternatives as they affect the soil resource includes the following:

National Forest Management Act of 1976: Renewable Resource Program “(C) recognize the fundamental need to protect and where appropriate, improve the quality of soil, water and air resources.”

National Soil Management Handbook: The Soil Management Handbook (USDA-FS 1991b) is a National soils handbook that defines soil productivity and components of soil productivity, establishes guidance for measuring soil productivity and establishes thresholds to assist in National Forest planning.

Pacific Southwest Region Soil Management Handbook Supplement: The Forest Service Pacific Southwest Region Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1) establishes regional soil quality analysis standards. The analysis standards address three basic elements for the soil resource: (1) soil productivity (including soil loss, porosity and organic matter), (2) soil hydrologic function and (3) soil buffering capacity. The analysis standards are to be used for areas dedicated to growing vegetation. They are not applied to lands with other dedicated uses, such as developed campgrounds, administrative facilities or in this case, the actual land surface authorized for travel by the public using various kinds of vehicles.

Regional Forester’s Letter (dated Feb 5, 2007): This letter provided clarification to Forest Supervisors on the appropriate use of the Pacific Southwest Region Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1). It states in part:

“Analysis or evaluation of soil condition is the intended use of the thresholds and indicators in Pacific Southwest Region FSH Supplement 2509.18-95-1. They are not a set of mandatory standards or requirements. They should not be referred to as binding or mandatory requirements in NEPA documents. Standards and guidelines in Forest Land and Resource Management Plans provide the relevant substantive standards to comply with NFMA.

The thresholds and indicators represent desired conditions for the soil resource. Use of the thresholds and indicators provides a consistent method to analyze, describe and report on soil condition throughout the region.”

LRMP Soils Standards and Guidelines for General Forest

The LRMP provides for management standards and guidelines to all management areas and analysis areas or aggregates of analysis areas (USDA-FS 1991). These standards and guidelines (S&G) are as follows:

1. Improve water quality and protect soil productivity by restoring deteriorated watersheds on the basis of economic efficiency and severity of problems and its impact on downstream beneficial uses (see LRMP S&G 122).
2. Apply appropriate erosion prevention measures on all ground disturbing activities (FSH 2409.23) prior to fall storms (October 1) and immediately upon completion of activity begun after November 1 (see LRMP S&G 127).
3. Apply appropriate erosion prevention measures on high erosion hazard soils under the following conditions: (see LRMP S&G 128).
 - a. When exposed soils from an average of several 500-foot linear transects:
 - i. Exceed 150 feet on slopes of 15-35 percent,
 - ii. Exceed 75 feet on slopes 35-65 percent,
 - iii. Exceed 25 feet on slopes over 65 percent,
 - b. On linear disturbances, such as skid trails and fire lines, cross-drain area at the following intervals:

Interval between Cross-Drain (feet)

Percent Slope	HEHR	VHEHR
0-15	150	125
15-35	75	45
35-65	35	20
65+	15	15
HEHR – High Erosion Hazard Rating VHEHR – Very High Erosion Hazard Rating		

4. Road construction on areas with High and Very High Erosion Hazard will follow standards in FSM 2521 Sierra Supplement No. 8, which gives direction concerning stabilization and road surface drainage (see LRMP S&G 129, USDA-FS 1991 and LRMP Letter of Clarification, USDA-FS 2009).

Effects Analysis Methodology

Soil quality effects analysis was based on identifying areas of risk on the SNF. The analysis used GIS and the published Order 3 Soil Resource Inventory (SRI) to rank proposed unauthorized routes by erosion potential (Giger and Schmitt, 1993).

An analysis of soil data was conducted on all unauthorized routes to determine erosion hazard rating, sensitivity and hydrologic function. This analysis resulted in a soil risk assessment that identified routes that are most susceptible to erosion and have the highest potential for degraded soil productivity. The results of this assessment were to determine which routes did or did not

need to be reviewed in the field. The assessment assigned a rating of 1 to 5 based on the following criteria:

1. The unauthorized route was considered; a field visit is not necessary; the effects of adding the route to the NFTS will not be adverse assuming routine maintenance.
2. The unauthorized route was considered, a field visit was made and the effects will not be adverse assuming routine maintenance.
3. The unauthorized route was considered, a field visit was made and site specific mitigation is prescribed to reduce the effects to less than adverse.
4. The unauthorized route was considered, a field visit was made and a determination was made that the effects would be adverse. The route is not recommended by the specialist for inclusion.
5. The unauthorized route was considered, more information is needed to make a determination.

This assessment was used to prioritize field review. The following is a description of the methodology and assumptions:

1. Maximum Erosion Hazard Rating (MEHR), soil texture and rock fragments were tabulated from the Order 3 SRI.
2. Unauthorized routes with high gradients (>15 percent grade) and high or very high MEHR were considered high risk, assuming routine maintenance.
3. Unauthorized routes with lower gradients and moderate MEHR were considered low risk, assuming routine maintenance.
4. Unauthorized routes with higher gradients and high or very high MEHR were considered high risk. These routes were further evaluated by GIS and field work to determine potential for adverse effects such as loss of water control on roads and trails. A secondary indicator, Hydrologic Function Class (HFC) was used to predict where some roads may be sensitive to damage and loss of hydrologic function. HFC was used as a tool for prioritizing field work and as an indicator to compare alternatives. The red/yellow/green monitoring criteria was used to evaluate the observed conditions and to validate the initial office GIS risk assessment.
5. Unauthorized routes were evaluated for surface condition using a green, yellow, red surface condition class and to validate the initial office GIS risk assessment. Green condition class indicates a trail in good condition with little sign of erosion. Yellow condition class indicates a trail segment that is experiencing some erosion because cross ditches are only partially functional or there is an insufficient frequency of cross ditches per linear distance along the trail. Red condition class indicates a trail segment that is eroding severely and the cross ditches are not functioning.
6. Unauthorized routes in a red condition class or have a high potential for adverse effects (surface erosion and loss of water control) were considered for mitigation or were not eligible to be brought into the NFTS. Mitigation was documented by route. See Appendix A for specific mitigation measures for routes. Where unauthorized routes were recommended as not eligible to be brought into the NFTS, site-specific concerns were given.
7. Parking/staging areas and areas have similar effects to soil resources.

8. In summary, unauthorized routes were initially reviewed to determine if the soil that the route is located on is considered sensitive. Unauthorized routes on non-sensitive soils were given a rating of 1 and were considered not to need a field review from a soil resource perspective. Unauthorized routes located on sensitive soils were field reviewed and based upon a field review were given a rating of 2, 3 or 4. Further analysis of the routes and soils determined the soil Hydrologic Function Class according to the ranking criteria. The HFC class is used to determine the potential effects on the proposed routes to the soil resource.

Data Sources

1. Route specific data collected in the field using established protocols for road erosion inventories and motor vehicle red/yellow/green inventories (see project record OHV Route Evaluation Forms).
2. Inventoried routes identified in Alternatives 2, 4 and 5 and provided in GIS spatial form and associated tabular data sets.
3. SNF soil survey GIS spatial form and associated tabular data sets.
4. Assessment for passive recovery of routes closed to motor vehicle traffic (Rojas 2008). Passive recovery of trails was determined based on soil productivity and vegetation of the surrounding area. Trails with highly productive, deep soils with bear clover are estimated to recover within 5 years. Trails with shallow soils and rock outcrop with little vegetation could take 15 to 50 years to recover.

Soil Resource Measurement Indicators

- Miles of unauthorized routes displayed by MEHR (as defined by the R-5 Maximum Erosion Hazard Rating).
- Miles of unauthorized routes displayed by Hydrologic Function Class (HFC).

The indicator, HFC is a soil hazard interpretation that predicts where roads and trails are prone to failure of drainage structures. HFC is a function of mechanical rutting potential, erosion potential and loss of water control. Some roads are more sensitive to damage of the road surface from rutting, erosion and loss of water control. Soil engineers may state this as a loss of hydrologic function. In extreme cases a loss of the facility is possible. HFC is based on soil properties, including soil texture and coarse fragment content, that determine how a native surface road or trail will mechanically rut and erode with traffic. HFCs are adapted from the FS Pacific Southwest Region Soil Interpretations (USDA-FS 1999a). HFC is a filter or method to predict weak areas in a transportation system that may require a higher level of maintenance, mitigation and in some cases a recommendation to close the facility.

Classes and soils are described below:

- *Mechanical Rutting and High Erosion* is most prevalent on soils that are considered sensitive on the SNF. Sensitive soils include Holland family, Auberry family and Ultic Haploxeralfs and are known to rut and erode easily. These soils have argillic or clay loam subsoils that are highly susceptible to rutting and erosion when exposed and wet. If these soils are used under wet conditions, cross drain features such as water bars are easily breached and erosion can develop into severe gully erosion. High erosion potential is greater on unauthorized routes with steep gradients (16 to 25 percent) and very steep gradients (26 percent and higher) (See Table 3- 51).

Table 3- 51. Hydrologic Function Class – Susceptibility to Mechanical Rutting and High Erosion

Factors Affecting	Slight	Moderate	Severe
Soil texture of family particle size control section	COSL and coarser Coarse Textured Sandy Loams	L, SL, FSL, SIL, VFSL Medium Textured Loams	C, SIC, SC, CL, SICL, SCL Fine Textured Clay Loams
Coarse fragments (percent) by volume	>25	10 - 25	<10
MEHR	Moderate or less	High	Very High

COSL- coarse sandy loam; L- loam; SL- sandy loam; FSL- fine sandy loam, SIL- silty loam; VFSL-very fine sandy loam; C-clay; SIC- silty clay; SC- sandy clay; CL- clay loam; SICL- silty clay loam, SCL sandy clay loam.

GIS was used to sort route segments that have mechanical rutting and erosion concerns based on the above hazard classes. The hazard classes are not hypothetical; they were verified by field observation.

Soil Resource Methodology by Action

The analysis methodologies for each of the four actions that make up the alternatives and cumulative effects of the actions are described below.

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

The prohibition of cross-country travel is focused on the effects from unauthorized use. Considerations and the indicators of effects are given below:

Indicator(s): Miles of unauthorized routes displayed by (1) MEHR and (2) HFC. Both indicators are a soil hazard interpretation that ranks miles of route by potential for erosion and loss of water control. The assumption is that effects are related to the miles roads, trails and areas proposed to be closed by prohibiting cross-country travel. It is also assumed that unauthorized routes will passively recover.

Direct Effects from unauthorized use: Generally for the existing unauthorized routes, direct effects have already occurred. The direct effects were: physical displacement of soil caused by unauthorized motor vehicle traffic; loss of soil productivity from the displacement and loss of soil depth; loss in soil hydrologic function due to loss of soil and loss of soil cover.

Indirect Effects from unauthorized use: The removal of vegetation and exposure of soil in unauthorized routes and areas will result in erosion. These unauthorized routes and areas were not designed and have no runoff water control to protect the soil resource. Accelerated erosion is occurring on several unauthorized routes and off the routes to the point that soil surface horizons have been destroyed and soil productivity has been lost. Further loss of productivity will occur and diminished hydrologic function. A loss of water control and accelerated erosion on the un-maintained trail is an indirect effect.

Methodology: Unauthorized routes open for motor vehicle use are compared to GIS layers displaying MEHR and HFC.

Short-term time frame: The 1-year time frame looks at routes over the short-term. It does not provide time for passive recovery on closed routes.

Long-term time frame: The 20-year time frame looks at routes over the longer term. It provides time for passive recovery on closed routes. Passive recovery is assumed to be a benefit. Factors such as soil type, precipitation and temperature affect rates of vegetative recovery.

Spatial boundary: Project Area (see Figure 1-2).

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

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

The effects of adding facilities are focused on presently unauthorized roads, motorized trails, areas proposed to be added to the NFTS. This is a change from unauthorized and un-maintained to NFTS status. Considerations and the indicators of effects are given below:

Indicators: Miles of unauthorized routes added to the system displayed by MEHR and HFC.

Direct Effects: Generally, past direct effects have occurred from soil displacement caused by the unauthorized use. Direct effects could continue to occur. These direct effects result in a loss of soil productivity from the displacement and loss of soil depth and a loss in soil hydrologic function due to loss of soil and loss of soil cover. The assumption is that these past direct effects are related to total miles of routes converted from unauthorized to NFTS status.

Indirect Effects: Indirect effects to the soil resource from the addition of a previously unauthorized route to the designated system will be dependent upon what soil type the route is located on, its erosion potential and HFC and various factors associated with the routes, such as slope. Additional water runoff control (dips, cross ditches, etc.) measures may be needed to avoid indirect effects before authorized use can be allowed. The degree of indirect effects will be dependent on whether water control measures will be implemented or the effectiveness of the water control measures. Indirect effects occur later in time and/or offsite. Examples of indirect effects are uncontrolled runoff causing erosion down slope of the trail or sediment generated from erosion of a trail depositing in channel.

Field observations of soil response are used to formulate the expected direct, indirect and cumulative soil effects for each alternative.

Methodology: Unauthorized routes and areas were located by TEAMS. TEAMS is a Forest Service Enterprise Unit that was utilized to locate and GPS unauthorized routes. Unauthorized routes added to the system are compared to GIS layers displaying MEHR and HFC. Routes are compared with zones of varying erosion potential risk.

Short-term time frame: The 1-year time frame looks at routes over the short-term. It does not provide time for passive recovery on closed routes.

Long-term time frame: The 20-year time frame looks at routes over the longer term. It provides time for passive recovery on closed routes. Passive recovery is assumed to be a benefit. Factors such as soil type, precipitation and temperature affect rates of vegetative recovery.

Spatial boundary: Project Area (see Figure 1-2).

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

3. Changes to the existing NFTS (changes to vehicle class, season of use and opening or closing roads).

Changes to existing NFTS include (1) closed to open; (2) open to closed; (3) changes in vehicle type and season of use. Considerations and the indicators of effects are given below:

Indicator(s): Miles of NFTS roads or trails (closed to open/open to closed) displayed by (1) MEHR and (2) HFS. The indicators are a soil hazard interpretation that ranks miles of route by potential for erosion and loss of water control.

Direct Effects: The important effects are those focused on existing NFTS (closed to open/open to closed) roads. These are maintenance level 1 and 2 roads that change in status from (open to closed) or (closed to open) under action alternatives. Opening maintenance level 1 and 2 roads poses a higher risk of causing negative soil effects compared with the effects of closing routes or the effects of changing vehicle type. The use of roads that were previously closed disturbs and loosens soil on the road surface and subsequent rainfall subjects the disturbed soil to erosion. The assumption is that a change in vehicle type will either keep the existing road width the same or the road will eventually narrow if used by ATVs or motorcycles. A change in vehicle type only would represent no increase of soil or land area for routes.

Indirect Effects: An action alternative may place control on the season of use for an area. This will generally have a positive indirect effect because it will reduce damage to the facility tread and its erosion control structures during the most susceptible time of the year. Placing control on the season of use will reduce the risk but not eliminate erosion to soil down slope.

Methodology: GIS analysis to compare the location of the trail/roads in each alternative with the zones of varying erosion potential risk. Field observations of soil type response formulate the discussion of expected effects for each alternative.

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: Project Area (see Figure 1-2).

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

4. Non-Significant LRMP Amendments

As explained in section 3.1.1 the non-significant LRMP amendments do not have unique effects when compared to the other actions analyzed in this FEIS. Therefore the environmental consequences have been analyzed and will not be discussed further in the soil resource section.

5. Cumulative Effects

Cumulative soil effects have been addressed under the cumulative watershed effects (CWE) section under the water resources section. Analysis of cumulative soil effects use the Equivalent Roaded Acre (ERA) Model, which is used in the CWE analysis. The ERA model quantifies disturbance based on the degree of disturbance as compared to an acre of road and measured relative to disturbance in a given watershed. ERAs reflect changes to Soil Hydrologic Function and are an indicator of rutting potential, erosion potential and loss of water control. See the CWE analysis description in the Water Resources section for a full description of assessment and assumptions, including a list of past, present and future foreseeable actions. The FS Pacific Southwest Region methodology is used to determine the overall disturbed footprint. The disturbed footprint is a semi-quantitative measure of acres of detrimental soil disturbance and

hence an approximation of change in Soil Quality as defined by the Pacific Southwest Region Soil Quality Standards (USDA 1995a).

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

Long-term timeframe: The long-term time frame used for Cumulative Watershed Effects is 30 years. Thirty (30) years has been determined to be the average amount of time for disturbed soils to fully recover from a hydrologic standpoint. See Cumulative Watershed Effects Analysis in the Water Resource section of this report.

Spatial boundary: The analysis area is by Hydrologic Unit Code (HUC) HUC 8 subdrainage area within the Project Area (see Figure 1-2). The Sierra National Forest is divided and sub-divided into successively smaller hydrologic units which are classified into eight levels. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of 2 to 16 digits based on the 8 levels of classification in the hydrologic unit system. The HUC 8, subdrainage level is the smallest drainage area delineated on the Sierra National Forest.

Indicator(s): (1) Cumulative effects on soil productivity from unauthorized routes and areas (No Action); (2) Cumulative effects on soil productivity from unauthorized routes and areas that are expected to recover (in the given long-term analysis time period) after cross-country prohibition is implemented; (3) Cumulative effects on soil productivity from unauthorized routes and areas that are not expected to recover passively (in the given long-term analysis period) after a cross-country prohibition is implemented; (4) Cumulative effects on soil productivity from implementation of the particular travel system for each alternative.

Methodology: Utilize observations and understanding of short-term effects to soil productivity to estimate long-term expected cumulative effects on soil productivity. Utilize the ERA analysis as a semi-quantitative measure of acres of detrimental soil disturbance and hence an approximation of change in Soil Quality.

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

3.8.2 Affected Environment

Current management consists of managing off-highway use as determined by the Forest Supervisor in April 1977 (USDA-FS 1977a). This decision was implemented by Forest Order 15-77-3. The plan identified areas where motorized travel was prohibited or motorized travel was restricted to designated routes. On the SNF these areas can be described as lands approximately below 6800 ft in elevation. In this alternative, 605,000 acres of National Forest System lands would remain open to motorized cross-country use. Current management of the NFTS roads is defined under the SNF 1999 Road Closure Plan and implemented by Forest Order R5-83-3.

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

The SNF has a high diversity of soil types. Elevation and geology control patterns of soil at the landscape scale. Elevations range from 3,000 to 6,800 feet within the footprint of the proposed actions. Soils are formed from granitic, volcanic and meta-sedimentary parent materials. There

are approximately 550 miles of unauthorized motorized trails that are not part of the NFTS of trails that are underlain with 27 soil types, including rock outcrop, that combine into 75 soil map units. The 10 most dominant soil map units affected by the project are described in Table 3- 52.

Table 3- 52. Ten Most Dominant Soil Map Units Affected by Unauthorized Motorized Routes

Soil Map Unit	Soil Map Unit Name
139	Holland-Chaix families complex, 35 to 65 percent slopes
137	Holland Family, 35 to 65 percent slopes
140	Holland-Chawanakee families complex, 35 to 65 percent slopes
136	Holland family, 5 to 35 percent slopes
113	Cagwin Family-Lithic Xeropsamments-rock outcrop complex , 15 to 45 percent slopes
161	Sirretta Family and Umpa family, wet, 2 to 25 percent slopes
126	Chawanakee Family-Rock Outcrop complex, 35 to 65 percent slopes
138	Holland-Chaix families complex, 5 to 35 percent slopes
120	Chaix Family, deep, 5 to 45 percent slopes
143	Ledford Family-Entic Xerumbrepts-Rock Outcrop association, 10 to 45 percent slopes

The sensitive soil types that would be affected by the proposed motorized trails are described in Table 3- 53. Sensitive soils include Holland family, Auberry family and Ultic Haploxeralfs. A full description of these soils can be found in the Order 3, Soil Survey of the SNF (Giger and Schmitt 1993).

These are sensitive soils that rut and erode easily and are prone to a loss of water control and soil hydrologic function. These soils have an argillic (clay) subsoil, that when exposed to rainfall and runoff can develop accelerated erosion in the form of severe gully erosion. Unauthorized motorized trails are difficult to maintain when used during wet weather conditions, because cross drain structures, such as water bars can be breached. As shown in Table 3- 53, there is a total of approximately 194.65 miles of unauthorized motorized trails that are located on soil map units with sensitive soil types. Some of these soil map units consist of multiple soils types that are not considered sensitive.

Table 3- 53. List of Sensitive Soil Map Units and Unauthorized Motorized Routes

Soil Map Unit	Soil Map Unit Name	Route (mi)
136	Holland family, 5 to 35 percent slopes	38.3
140	Holland-Chawanakee families complex, 35 to 65 percent slopes	31.7
141	Holland-Chawanakee families-rock outcrop complex, 15 to 35 percent slopes	20.8
137	Holland Family, 35 to 65 percent slopes	19.9
139	Holland-Chaix families complex, 35 to 65 percent slopes	17.4
138	Holland-Chaix families complex, 5 to 35 percent slopes	13.6
142	Holland-Neuns families association, 15 to 45 percent slopes	11.2
171	Ultic Haploxeralfs-Dystric Lithic Xerochrepts complex, 15 to 50 percent slopes	7.5
108	Auberry-Ahwahnee Families association, 35 to 65 percent slopes	5.0
124	Chaix-Holland Families complex, 15 to 35 percent slopes	4.4
110	Auberry-Tollhouse Families-rock outcrop association, 25 percent slopes	4.3
107	Auberry-Ahwahnee Families Association, 5 to 35 percent slopes	4.0
173	Ultic Haploxeralfs-Dystric Lithic Xerochrepts complex, 50 to 85 percent slopes	3.2
171	Ultic Haploxeralfs, deep, 15 to 50 percent slopes	2.6
127	Coarsegold-Auberry Families association, 35 to 65 percent slopes	2.6
125	Chaix-Holland families complex, 35 to 65 percent slopes	2.6
105	Auberry Family, 5 to 35 percent slopes	1.7
106	Auberry Family, 35 to 65 percent slopes	1.7
130	Dystric Lithic Xerochrepts-Ultic Haploxeralfs-rock outcrop association, 50 to 80 percent slopes	1.6
128	Coarsegold-Auberry Families-rock outcrop association, 35 to 85 percent slopes	0.8
109	Auberry Family-Rock Outcrop complex, 35 to 75 percent slopes	0.02
Total (miles)		194.9

Affected Environment by Analysis Unit

The soil resource affected environment is described by 10 analysis units that include: South Fork, Westfall, Globe, Mammoth, Gaggs, Jose-Chawanakee, Dinkey-Kings, Stump Springs-Big Creek, East of Kaiser Pass, and Tamarack-Dinkey (see Figure 3 in Chapter 2 for map of analysis units).

South Fork

There is a total of 22.5 miles of unauthorized routes in the South Fork analysis unit. Approximately 20.34 miles of unauthorized motorized trails are located on sensitive soils. These routes all have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Westfall

The Westfall analysis unit has approximately 112.59 miles of unauthorized routes. Approximately 84.1 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential. Monitoring of the Miami Motorcycle Trail Network for erosion and surface condition was conducted on 24.3 miles of motor vehicle trails in June, 2000. The results of the monitoring found

16 percent of the trails in a red surface condition class, 25.4 percent in a yellow surface condition class and 58.6 percent in a green surface condition class. Recommendations in this monitoring report include rerouting trail segments in a red surface condition class to more gentle and less erosive terrain (Roath 2000).

Globe

The Globe analysis unit has approximately 65.15 miles of unauthorized routes. Approximately 2.6 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Mammoth

The Mammoth analysis unit has approximately 38.59 miles of unauthorized routes. Approximately 15.86 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Gaggs

The Gaggs analysis unit has approximately 82.91 miles of unauthorized routes. Approximately, 20.90 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Jose-Chawanakee

The Jose-Chawanakee analysis unit has approximately 21.57 miles of unauthorized routes. Approximately, 14.77 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Dinkey-Kings

The Dinkey-Kings analysis unit has approximately 60.84 miles of unauthorized routes. Approximately, 32.65 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Stump Springs-Big Creek

The Stump Springs-Big Creek analysis unit has approximately 18.07 miles of unauthorized routes. Approximately, 3.29 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

East of Kaiser Pass

The East of Kaiser Pass analysis unit has approximately 20.90 miles of unauthorized routes. Approximately, 0.14 miles of unauthorized motorized trails are located on sensitive soils. The unauthorized routes with sensitive soils have sandy clay loam subsoil, have less than 25 percent coarse fragment content and have a severe mechanical rutting and high erosion potential.

Tamarack-Dinkey

The Tamarack-Dinkey analysis unit has approximately 108.61 miles of unauthorized routes. There are no sensitive soils in the Tamarack-Dinkey analysis unit. The Bald Mountain OHV area is located within the Tamarack-Dinkey analysis unit. Monitoring of the Bald, Brewer and Spanish OHV Trail Network for erosion and surface condition was conducted on 21.2 miles of motor vehicle trails in October, 2002. The results of the monitoring found 99 percent of the trails in a Green Surface Condition Class in the Brewer Area, 95.1 percent in a Green Surface Condition Class and 4.9 percent in a Yellow Surface Condition Class in the Spanish Area. Recommendations in this monitoring report include limiting multiple trails and cross ditching (Roath 2002).

3.8.3 Environmental Consequences

Effects Analysis

The principal concern or effect to be assessed for the soil resource is the potential for soil erosion and indirect effects on soil productivity or the ability of the soil to produce vegetation.

Secondary effects from erosion are the loss of soil depth, infiltration capacity and permeability or reduction in the soil hydrologic function.

The effects analysis for the soil resource should focus on the risk of soil erosion from trail/road runoff water to the soil next to or down slope.

Soil Productivity

The erosion that may occur from NFTS trails or road surfaces is a concern regarding loss or degradation of the facility, but not a particular concern for the soil resource, because the route surface is a dedicated use and no longer dedicated to growing vegetation. Basically, soil productivity is not a particular concern 1) if an unauthorized route is converted to a system route (NFTS); or 2) if the unauthorized route is closed and re-vegetated (passive recovery). There is a positive effect to closure of unauthorized routes, in that they passively recover, soil productivity is returned to these sites and accelerated erosion is reduced.

Alternative 1 – No Action

Alternative 1 continues the prohibition of motorized cross-country travel where motorized travel was prohibited or motorized travel was restricted to designated routes and adds no new NFTS facilities. Alternative 1 allows motorized cross-country travel in areas on the SNF, outside those areas where motorized travel was prohibited or motorized travel was restricted to designated routes.

Direct and Indirect Effects

Under this alternative there is concern for the soil resource for 38.5 miles of unauthorized routes that have a were given a soil rating of 3 and 4 out of 106 miles assessed. See effects methodology section for a description of the rating system. This is not all of the inventoried unauthorized motorized trails. There are 8.5 miles of unauthorized routes with a 4 rating and at least 50 percent of the route with a red rating using the green, yellow, red soil monitoring rating system. These routes have severe gully erosion and in several cases there is a bypass route to the motorized trail. The routes with a 3 rating have at least 50 percent of the route with a yellow rating and a portion of the route with a red rating. The routes with a 3 and a yellow rating are in critical need of

erosion control measures to prevent the routes from going into a red category. In the Miami Creek area, it was estimated over an 11 year period between 1989 and 2000 that there was an increase of 0.5 miles of unauthorized motorized trails (Roath 2000). Over a 20-year period, using the value found during the 11-year monitoring interval between 1989 and 2000, there could be an increase of at least 10 miles of motor vehicle trails in the Miami Creek area. Unauthorized motorized trails in the other analysis areas would also increase. Passive recovery of the unauthorized motorized trails will not occur. Unrestricted use of these unauthorized motorized trails and continuance of cross-country travel will not meet soil standard and guidelines.

There are over 243 acres of inventoried and GPS, unrestricted areas that will continue to be used and enlarged by the motorized recreation community. This could result in degradation of the soil resource and loss of soil productivity. These areas will not meet soil standard and guidelines. Unauthorized routes and areas were located using GPS by TEAMS.

There are approximately 574 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

The CWE (Gallegos 2009) analysis established that existing past impacts had raised some subdrainages to percent ERAs levels that exceeded their respective lower Threshold of Concern (TOC) ERA value and above the upper TOC ERA value. The CWE assessment evaluated 487 HUC 8 subdrainages over the area where unauthorized motorized trails occurred. There are a total of 534 channel crossings, within 25 subdrainages, associated with unauthorized motorized trails proposed in this alternative. Fifteen subdrainages have a low potential for CWE, five subdrainages have a moderate potential for CWE and five subdrainages have a high potential for CWE. See Water Resources, Cumulative Watershed Effects (CWE), Alternative 1 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Alternative 2 – Proposed Action

The proposed action is comprised of the prohibition of cross-country motorized travel, the proposed changes to the existing NFTS and the additions to the NFTS as described in the NOI published September 11, 2007 (Volume 72, Number 175) with some modifications (See Chapter 2).

Direct and Indirect Effects

Under this alternative, 4.58 miles of proposed motorized trails that will be included in the NFTS were given a soil rating of 4 and at least 50 percent of the proposed trail has a red rating using the green, yellow, red soil monitoring rating system. The trails will be difficult to maintain and there is a high likelihood that the design and mitigation measures will not be effective due to the sensitivity of the soils. These trails will be closely monitored to ensure effectiveness of the measures and to determine if the trails should stay on the NFTS trail system. These proposed trails were given a soil rating of 4, because a determination was made that the effects could be adverse. The adverse affect will be short-term and will not be permanent or irretrievable. These trails are included in the proposed action even though they have a soil rating of 4, because of the assurance of close monitoring and the ability to remove the trails off the NFTS trail system, if an adverse effect occurs. This decision could be made after the 5th year of monitoring. These proposed trails have severe gully erosion on trail gradients that range from 25 to 35 percent, and in several cases there is a bypass route to avoid the gully. These proposed trails would be

mitigated by: re-aligning the trail, within 15 meters (49 feet) of centerline; restoring the old trail by regrading; tread hardening; erosion control; stream crossing structures; seasonal restriction; installation of barriers; and monitoring. See Table 3- 54 and Appendix A for list of design features and mitigation measures applied to each proposed trail. It is unknown how effective the mitigation measures will be for these proposed trails.

There are 35.7 miles of proposed motorized trails that were given a soil rating of 1 to 3. Approximately 4.9 miles of proposed motorized trails that were rated 3 will require mitigation measures other than general maintenance (see Table 3- 55). These mitigation measures will be implemented before the facility is open to the public. See Appendix A for a description of the mitigation measures associated with resource issue codes.

Monitoring associated with resource issue code SW-27 will provide information to determine whether there is a need for additional actions to protect soil/watershed resources in the long term.

Table 3- 54. Alternative 2 – Proposed Motorized Trails with Adverse Effect

Analysis Unit	ID	Length (mi)	Tread Width	Assessment Rating	Soil and Water Resource Issue Codes
West Fall	JM-2y	0.50	24-50_INCH	4	SW-1, SW-2, SW-3, SW-15, SW-16, SW-19, SW-27
West Fall	JM-36	0.65	24-50_INCH	4	SW-1, SW-3, SW-15, SW-16, SW-19
West Fall	JM-7ay	1.01	24-50_INCH	4	SW-1, SW-2, SW-3, SW-14, SW-15, SW-16, SW-19, SW-27
West Fall	PK25	0.53	24-50_INCH	4	SW-1, SW-2, SW-3, SW-7, SW-15, SW-16, SW-19, SW-27
West Fall	PK-5	1.64	24-50_INCH	4	SW-1, SW-2, SW-3, SW-7, SW-15, SW-16, SW-19, SW-27
West Fall	SR-45z	0.25	24-50_INCH	4	SW-1, SW-2, SW-3, SW-7, SW-8, SW-9, SW-14, SW-15, SW-16, SW-19, SW-27
Total		4.58			

Table 3- 55. Alternative 2 – Proposed Trails that Require Mitigation

Analysis Unit	ID	Length (mi)	Assessment Rating	Soil and Water Resource Issue Codes ¹
West Fall	JM-23	0.42	3	SW-2, SW-27
West Fall	JM-27z	0.28	3	SW-2, SW-7, SW-27
West Fall	PK22	0.49	3	SW-19
West Fall	PK24	0.62	3	SW-2, SW-7, SW-27
West Fall	SR-13z	0.34	3	SW-2, SW-27
West Fall	SR-21z	0.83	3	SW-15, SW-16, SW-19, SW-3, SW-2, SW-27, SW-7
West Fall	SR-56z	0.10	3	SW-2, SW-7, SW-27
West Fall	SR-92	0.16	3	SW-2, SW-7, SW-27
West Fall	SR-94	0.21	3	SW-2, SW-7, SW-27
West Fall	SV31	0.11	3	SW-2, SW-7, SW-27
West Fall	SV35	1.18	3	SW-2, SW-7, SW-27
West Fall	TR-08	0.12	3	SW-2, SW-7, SW-27
Total		4.86		

¹Resource Issue Codes are defined in Appendix A of this FEIS. Design features and mitigation measures associated with these codes are applied to individual facilities, also found in Appendix A.

There is one, 6.12 acre area, called HSA-01 that has a slight HFC and is not a concern for the soil resource.

There are approximately 550 miles of inventoried unauthorized routes. Approximately 514 miles of unauthorized trails will be unavailable for public use, because motorized cross-country travel would be eliminated in Alternative 2. Based on the passive recovery analysis of unauthorized routes, approximately 429 miles of unauthorized routes would recover within 20 years. These routes are on deep, highly productive soils with vigorous vegetation, such as Bear Clover. Approximately, 62 miles of unauthorized routes would recover within 20 to 30 years. These routes are on moderately deep, shallow soils at higher elevations and have less vigorous vegetation growing adjacent to the trails. Approximately, 23 miles of unauthorized routes are expected to take more than 30 years to recover. These routes are on shallow soils with rock outcrop and sparse vegetation.

The soil concern for changes in the open and seasonal closure of NFTS roads and trails includes using NFTS facilities with sensitive soils and native surface during the wet season, which could cause rutting and off site erosion. There are 898 miles of NFTS facilities that will have changes in the open and season closure period. There are approximately 421 miles of NFTS facilities open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

See Water Resources, Cumulative Watershed Effects (CWE), Alternative 2 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Alternative 3

Alternative 3 responds to issues of impacts to natural and cultural resources and impacts to non-motorized recreational experience by prohibiting motorized cross-country travel. Seasonal open

and closure periods to existing NFTS roads and trails will not change from current management and no NFTS roads or trails will be added to the system. This alternative also provides a baseline for comparing the impacts of other alternatives that propose changes to the NFTS in the form of new facilities (roads, trails, areas). None of the unauthorized routes or areas would be added to the NFTS under this alternative.

Direct and Indirect Effects

There are approximately 550 miles of unauthorized routes that will not be used and will eventually recover soil productivity. Most of the unauthorized routes will revegetate and soil cover will be re established.

Based on the passive recovery analysis of unauthorized routes, approximately 473 miles of unauthorized routes would recover within 20 years. These routes are on deep, highly productive soils with vigorous vegetation, such as Bear Clover. Approximately, 62 miles of unauthorized routes would recover within 15 to 30 years. These routes are on moderately deep, shallow soils at mixed elevations and have less vigorous vegetation growing adjacent to the trails. These include JG5, JM-18, JSM61, PK-114z, PK-128, PK-51x, TH-28x, TH-31x, TH-47z, TH-48z, TH-54z, TH-56y, TH-41, JH-11, JH-12, JH-15, JH-18b, JH-40, JH-56, JH-78z, JH-90, JH-91, PK-01z, PK-04, PK-17, PK-22, PK-25, PK-41, PK-64, PK-65, PK-66. Approximately 23 miles of unauthorized routes would recover within 15 to 50 years. These routes are on shallow soils with rock outcrop and sparse vegetation. These include; AE-13, JH-20y, PK-05x, BP48, JSM56, TH-161z, JH-73, JH-77, JH-79, PK-01zf, PK-01zh, PK-01zk, PK-37, PK-39, PK-40, PK-41. Portions of eight unauthorized routes in the Miami Creek Basin and one unauthorized route in Jose-Chawanakee, totaling 8.79 miles are not expected to completely recover. These unauthorized routes have severe gully erosion, up to 3 feet deep and top soil has been displaced and severely disturbed. These unauthorized routes include: ES1, JM-17z, JM-2y, JM-36, JM-7ay, PK25, PK-5, SR-45z, and SV16. There are still a substantial number of unauthorized routes that have not been reviewed and their expected rate of recovery is unknown.

Alternative 3 does not change the open and closure season of roads, but is discussed in this alternative as a baseline to compare this action proposed in the other alternatives. The soil concern for changes in the open and seasonal closure of NFTS roads includes using roads with sensitive soils and native surface during the wet season. This could cause rutting of the road and off site erosion. There are approximately 574 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

Cumulative soil effects will be reduced from the elimination of motorized cross-county travel. The unauthorized routes will naturally recover and revegetate and soil cover will become established for most of the area now open to cross-country motorized travel. Sediment will be reduced and channel conditions and aquatic habitat conditions will improve. The ERA values in the 96 subdrainages that are over their respective lower TOC ERA values will decrease. Some of these subdrainages will continue to have potential from CWE from other activities occurring in the subdrainages. The Miami Creek area will be the most affected from natural recovery of unauthorized routes in these subdrainages. However, some of the unauthorized routes have resulted in severe gully erosion of up to 3 feet deep and top soil has been displaced and severely disturbed. See Water Resources, Cumulative Watershed Effects (CWE), Alternative 3 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Alternative 4

Alternative 4 responds to issues of impacts to motorized access and impacts to natural and cultural resources. This alternative adds roads and areas accessing recreation opportunities such as camping, fishing, picnicking and parking. This alternative provides safe traffic access while maintaining current passenger car recreational uses. This alternative also changes the location of many motorized trails and changes or applies additional seasonal or year-round closures (compared to Alternative 2) in cases where natural or cultural resource concerns were raised internally and/or by the public.

Direct and Indirect Effects

There are no proposed additions to the NFTS with potential to cause an adverse effect to the soil resource. There were no facilities with a soil rating of 4 included in this alternative. All 42 miles of proposed additions were given a soil rating of 1-3. Approximately 0.5 miles of proposed motorized trail (PK22) would require soil protection mitigation measures other than routine maintenance. These mitigation measures will be implemented before the trail is open to the public.

There are nine proposed areas that have a slight to moderate HFC (see Table 3- 56). These proposed areas were given a soil rating of 1 or 2. They are not a concern for the soil resource. It is assumed that routine maintenance to prevent runoff, erosion and a loss of soil productivity would be performed. There are 2 proposed areas that were given a severe HFC. These proposed areas were given a soil rating of 3. These proposed areas were field reviewed and determined to need mitigation that includes a seasonal restriction to prevent accelerated erosion. These areas will also be monitored to determine if additional mitigation measures will be required for their management. The severe HFC rating does not indicate that the motorized areas will not meet soil standards and guidelines. The HFC of severe for BLKRCK77 and VSTDM363 would require more intensive maintenance, application of a wet season closure, and monitoring. If monitoring determines that OHV use of the areas are not meeting soil standards and guidelines, prescriptive actions, such as surfacing the areas with aggregate could be implemented..

Table 3- 56. Alternative 4 – Motorized Areas

Analysis Unit	Area ID	Assessment Rating	HFC
Dinkey-Kings	BLKRCK77	3	Severe
Dinkey-Kings	BLUCYN152	2	Slight
East of Kaiser Pass	KP@MHS9	2	Moderate
Gaggs	GRTRDCRK116	1	Slight
Gaggs	GRTRDCRK117	1	Slight
Tamarack-Dinkey	SFTMRCK179	2	Moderate
Tamarack-Dinkey	TULEMDW1	1	Slight
West Fall	CHPOSDDL390	2	Moderate
West Fall	FRSNODM94	1	Slight
West Fall	MCLDFLT375	2	Moderate
West Fall	VSTDM363	3	Severe

Because motorized cross-country travel would be eliminated, approximately 516 miles of unauthorized routes would no longer be used. Based on the passive recovery analysis of unauthorized routes, approximately 431 miles of unauthorized routes would recover within 20

years. Approximately 62 miles of unauthorized routes would recover within 15 to 30 years. Approximately 23 miles of unauthorized routes would recover within 15 to 50 years.

The soil concern for changes in the open and seasonal closure of NFTS facilities includes using roads or trails with sensitive soils and native surface during the wet season, which could cause rutting and off site erosion. There are 1742 miles of NFTS roads that will have changes in the open and season closure period. There are approximately 338 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

Cumulative soil effects will be reduced from the elimination of motorized cross-county travel. The unauthorized routes will naturally recover and revegetate and soil cover will become established for most of the area now open to cross-country motorized travel. Sediment will be reduced and channel conditions and aquatic habitat conditions will improve. The ERA values in the 96 subdrainages that are over their respective lower TOC ERA values will decrease. Some of these subdrainages will continue to have potential from CWE from other activities occurring in the subdrainages. The Miami Creek area will be the most affected from natural recovery of unauthorized routes in these subdrainages. However, some of the unauthorized routes have resulted in severe gully erosion of up to 3 feet deep and top soil has been displaced and severely disturbed. See Water Resources, Cumulative Watershed Effects (CWE), Alternative 4 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Alternative 5

Alternative 5 responds to the issues of impacts to motorized access and motorized use and ownership conflicts. This alternative adds some trails to provide a greater number and variety of motorized recreational experiences and more roads and areas accessing recreation opportunities such as camping, fishing, picnicking and parking. Seasonal and year-round closures are applied where needed for resource protection. This alternative provides safe traffic access while adding motorized trails to address the concerns identified by the public that concentrating motorized use to fewer designated facilities and areas would cause overcrowding and possible degradation of the motorized recreational experience.

Direct and Indirect Effects

Under this alternative there is concern for the soil resource for 1.61 miles of unauthorized routes that were given a soil rating of 4 where at least 50 percent has a red rating using the green, yellow and red soil monitoring rating system. The trails will be difficult to maintain and there is a high likelihood that the design and mitigation measures will not be effective due to the sensitivity of the soils. These trails will be closely monitored to ensure effectiveness of the measures and to determine if the trails should stay on the NFTS trail system. These proposed trails were given a soil rating of 4, because a determination was made that the effects could be adverse. The adverse affect will be short term and will not be permanent or irretrievable. These trails are included in the proposed action even though they have a soil rating of 4, because of the ensurance of close monitoring and the ability to remove the trails off the NFTS trail system, if an adverse effect occurs. This decision could be made after 5 years of monitoring. These proposed trails have severe gully erosion on trail gradients that range from 25 to 35 percent, and in several cases there is a bypass route to avoid the gully. These proposed trails would be mitigated by: re-aligning the trail, within 15 meters of centerline; restoring the old trail by regrading; tread hardening; erosion

control; stream crossing structures; seasonal restriction; installation of barriers; and monitoring. See Table 3- 54 and Appendix A for list of design features and mitigation measures applied to each proposed trail. It is unknown how effective the mitigation measures will be for these proposed trails. Monitoring associated with resource issue code SW-27 will provide information to determine whether there is a need for additional actions to protect soil/watershed resources in the long term.

Table 3- 57. Alternative 5 – Proposed Trails or Roads with Adverse Effects

Analysis Unit	ID	Length (mi)	Tread Width	Assessment Rating	HFC	Soil and Water Resource Issue Codes ¹
West Fall	JM-2y	0.50	24-50_INCH	4	Severe	SW-1, SW-2, SW-3, SW-15, SW-16, SW-19, SW-27
West Fall	JM-36	0.65	24-50_INCH	4	Severe	SW-1, SW-3, SW-15, SW-16, SW-19
West Fall	SV16	0.46	24_INCH	4	Severe	SW-1, SW-2, SW-3, SW-7, SW-14, SW-15, SW-16, SW-19, SW-27
Total		1.61				

¹Resource Issue Codes are defined in Appendix A of this FEIS. Design features and mitigation measures associated with these codes are applied to individual facilities, also found in Appendix A

There are 74.23 miles of proposed motorized trails that were given a soil rating of 1-3. Three (1.61 miles) were given a rating of 4. Approximately, 7.83 miles of these will require special mitigation measures other than routine maintenance (see Table 3- 58). These design features and mitigation measures will be implemented before they would be open to the public. See Appendix A – Summary of Facility Specific Data for the required design features and mitigation measures.

Table 3- 58. Alternative 5 – Proposed Trails and Roads That Require Design Features and/or Mitigation Measures

Analysis Unit	ID	Length (mi)	Assessment Rating	Resource Issue Code
West Fall	JM-14x	0.33	3	SW-2, SW-27
West Fall	JM-22y	0.34	3	SW-2, SW-27
West Fall	JM-23	0.42	3	SW-2, SW-7, SW-27
West Fall	JM-27z	0.28	3	SW-2, SW-7, SW-27
West Fall	JM-41	0.61	3	SW-2, SW-7, SW-27
West Fall	PK24	0.62	3	SW-2, SW-7, SW-27
West Fall	SR-13z	0.34	3	SW-2, SW-7, SW-27
West Fall	SR-56z	0.10	3	SW-2, SW-7, SW-27
West Fall	SR-92	0.16	3	SW-2, SW-7, SW-27
West Fall	SR-94	0.21	3	SW-2, SW-7, SW-27
West Fall	SV25	0.08	3	SW-2, SW-7, SW-27
West Fall	SV31	0.11	3	SW-2, SW-7, SW-27
West Fall	SV35	1.18	3	SW-2, SW-7, SW-27
West Fall	TR-08	0.12	3	SW-2, SW-7, SW-27
West Fall	JM-36	0.65	4	SW-1, SW-3, SW-15, SW-16, SW-19
West Fall	PK22	0.49	3	SW-19
West Fall	SR-21z	0.83	3	SW-15, SW-16, SW-19, SW-3, SW-2, SW-27, SW-7
West Fall	JM-2y	0.50	4	SW-1, SW-2, SW-3, SW-15, SW-16, SW-19, SW-27
West Fall	SV16	0.46	4	SW-1, SW-2, SW-3, SW-7, SW-14, SW-15, SW-16, SW-19, SW-27
Total		7.83		

There are 12 areas that have a slight to moderate HFC (see Table 3- 59). These proposed areas were given a soil rating of 1 or 2. These areas are not a concern for the soil resource. It is assumed that these areas will have general maintenance to prevent runoff, erosion and a loss of soil productivity. There are seven proposed areas that were given a severe HFC and a soil rating of 3. The severe rating was given to the areas because the areas are currently being used during wet weather conditions causing severe erosion. These proposed areas were field reviewed and determined to need mitigation that includes a wet season closure to prevent accelerated erosion. These areas will also be monitored to determine if additional mitigation measures will be required for their management. The severe HFC rating does not indicate that the motorized areas will not meet soil standard and guidelines. The severe HFC rating for the seven use areas indicates a higher level of maintenance and mitigation may be required. In this case mitigation includes wet season closure and monitoring. If monitoring determines that OHV use of the areas are not meeting soil and standard and guidelines, other mitigation, such as surfacing the areas with aggregate can be implemented.

The severe HFC rating does not indicate that the motorized areas will not meet soil standards and guidelines. The severe HFC of severe for the seven areas would require more intensive maintenance, application of a wet season closure, and monitoring. If monitoring determines that

OHV use of the areas are not meeting soil standards and guidelines, prescriptive actions, such as surfacing the areas with aggregate could be implemented.

Table 3- 59. Alternative 5 – Motorized Areas

Analysis Unit	Area ID	SOIL RATING	HFC
Dinkey-Kings	BLKRCK78	3	Severe
Dinkey-Kings	BLKRCK77	3	Severe
Dinkey-Kings	BLUCYN152	2	Slight
Dinkey-Kings	BLUCYN4	3	Severe
Dinkey-Kings	BLUCYN6	3	Severe
East of Kaiser Pass	KP@MHS9	2	Moderate
East of Kaiser Pass	ONSPRGSOF13	1	Slight
Gaggs	BSR373	3	Severe
Gaggs	CNTRLCMPSPR345	1	Slight
Gaggs	GRTRDCRK116	1	Slight
Gaggs	GRTRDCRK117	1	Slight
Gaggs	RCKCRKSPR391	2	Moderate
Gaggs	WHSKYFLLS351	1	Slight
Jose-Chawanakee	SGRLFHL223	3	Severe
Tamarack-Dinkey	SFTMRCK179	2	Moderate
Tamarack-Dinkey	TULEMDW1	1	Slight
West Fall	CHPOSDDL390	2	Moderate
West Fall	FRSNODM94	1	Slight
West Fall	MCLDFLT375	2	Moderate
West Fall	VSTDM363	3	Severe

Because motorized cross-country travel would be eliminated, approximately 482 miles of unauthorized routes would no longer be used. Based on the passive recovery analysis of unauthorized routes, 397 miles of unauthorized routes would recover within 20 years. Approximately 62 miles of unauthorized routes would recover within 15 to 30 years. Approximately 23 miles of unauthorized routes would recover within 15 to 50 years.

The soil concern for changes in the open and seasonal closure of NFTS roads and trails includes using roads with sensitive soils and native surface during the wet season, which could cause rutting of the road and off site erosion. There are 1688 miles of NFTS roads that will have changes in the open and season closure period. There is approximately 343 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown if road surface conditions are causing off site degradation to soil productivity.

Cumulative Effects

Cumulative soil effects will be reduced from the elimination of motorized cross-county travel. The unauthorized routes will naturally recover and revegetate and soil cover will become established for most of the area now open to cross-country motorized travel. Sediment will be reduced and channel conditions and aquatic habitat conditions will improve. The ERA values in the 96 subdrainages that are over their respective lower TOC ERA values will decrease. Some of these subdrainages will continue to have potential from CWE from other activities occurring in the subdrainages. The Miami Creek area will be the most affected from natural recovery of

unauthorized routes in these subdrainages. However, some of the unauthorized routes have resulted in severe gully erosion of up to 3 feet deep and top soil has been displaced and severely disturbed. See Water Resources, Cumulative Watershed Effects (CWE), Alternative 5 section for cumulative effects to soil resources and the project CWE report for specific details (Gallegos 2009).

Summary of Effects Analysis across All Alternatives

See Table 3- 60 for comparison of alternatives.

Table 3- 60. Soil Resources, Summary of Effects Analysis across All Alternatives

Comparison Criteria	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles with 4 Soil Rating and Requires Mitigation	8.5	4.58	N/A	0	1.61
Miles with 3 Rating and Requires Mitigation	0	4.86	N/A	.5	6.22
Miles that will Passively Recover within 20 Years	0	429	473	431	397
NFTS Roads or Trails On Native Surface (sensitive soils) open all year	574	421	574	338	343

Compliance with the LRMP, Travel Management Rule and Other Direction

Alternative 1, No Action, provides unrestricted use of the unauthorized routes assessed and continuance of cross-country travel will not meet soil standard and guidelines. There are approximately 574 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC. It is unknown whether the road surface condition is meeting the intent of the LRMP standard and guideline that calls for stabilization and providing road surface drainage (see LRMP S&G 129, USDA-FS 1991 and LRMP Letter of Correction, USDA-FS 2009).

Under Alternative 2, 3, 4 and 5, it is unknown whether the road surface condition is meeting the intent of the LRMP standard and guideline that calls for stabilization and providing road surface drainage (see LRMP S&G 129, USDA-FS 1991 and LRMP Letter of Correction, USDA-FS 2009). There are approximately 421 miles of NFTS roads open all year that have a native surface and were rated as having a severe HFC.

Other than road surfacing requirements under LRMP S&G 129, Alternatives 2-5 would be in compliance with LRMP standards and guidelines and the Travel Management Rule for minimizing effects to soil resources.