

# Sequoia National Forest Travel Analysis Evaluation Criteria<sup>1</sup>

## AQUATIC RISK FACTORS (3)

### 1. Geologic Hazard

#### *Description of Indicator*

The Geologic Hazard Factor uses landslide mapping and certain topographic, soil or rock materials, and geologic conditions as an indicator of potential future mass wasting and sediment production. In general, this factor identifies those roads located within potentially unstable terrain or within areas with high sensitivity to erosion. In this context it is used primarily as a water quality and aquatic species habitat risk factor. This factor evaluates the terrain that the road is located within and considers the terrain above and below the road. This factor is an indicator of the potential to initiate mass wasting or erosion from roads rather than the potential for impacts to roads from processes initiated upslope. This factor can also be viewed as an indicator for potential damage to the road system, cost of storm damage repair, or as an indicator of high maintenance needs.

1 = (Low hazard) No portion of the road segment lies within areas identified as high geologic hazard, and less than 10 percent of the road segment length is located within areas identified as moderate geologic hazard.

3 = (Moderate hazard) Less than 30 percent of the road segment lies within areas identified as high geologic hazard; OR 10 percent or greater of the road segment is located within areas identified as moderate geologic hazard.

6 = (High hazard) 30 percent or greater of the road segment is located within areas identified as high geologic hazard.

### 2. Stream Crossing Density

#### *Description of Indicator*

The Stream Crossing Density Factor determines the relative hazard associated with stream crossings within the road segment. This factor is defined in terms of the frequency of stream crossings per road mile for each road segment within a watershed of about 30,000 to 50,000 acres. The more frequent the stream crossings, the more potential there is to run over aquatic species, damage riparian habitat, add sediment to the stream or create impediments to species movement. The species potentially impacted include California red-legged frogs, Foothill and mountain yellow-legged frogs or Western pond turtles. Frequency values are generated from GIS based on the number of times a stream segment intersects the road segment.

1 = (Low risk) Road segment has a density of 0 to 2 stream crossings per road mile.

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<sup>1</sup> Development and other background information regarding the creation of the evaluation criteria will be included in the appendices of the Travel Analysis Report.

2 = (Moderate Risk) Road segment has a density of 3 to 4 stream crossings per road mile.

3 = (High Risk) Road segment has a density which exceeds 4 stream crossings per road mile.

### **3. Riparian Zone – Stream Proximity**

#### ***Description of Indicator***

The Riparian Zone – Stream Proximity Factor determines the relative degree of connectivity between the road system and the stream system. This factor is related to the portion of the road segment within the riparian zone or in close proximity to a stream. For this factor, riparian zones are defined as the area bordering a stream with potential for streamside habitat. The riparian zone is 300 feet wide on each side of perennial streams and 150 feet wide on each side of intermittent streams, as measured from the center of the stream channel. The longer a road follows a stream within the riparian zone, the more potential there is to run over aquatic species, damage riparian habitat, add sediment to the stream or create impediments to species movement. The species potentially impacted include California red-legged frogs, Foothill and mountain yellow-legged frogs or Western pond turtles.

1 = (Low risk) 0 to 5 percent of the road segment is within the riparian zone.

2 = (Moderate risk) 6 to 10 percent of the road segment is within the riparian zone.

3 = (High risk) Greater than 10 percent of the road segment is within the riparian zone.

#### **Aquatic Risk Factor Composite Rating**

A composite rating of low, moderate and high was assigned to each road segment based on combining values of the aquatic risk factors. A cumulative aquatic score was given from a sum total of all risk factors. The lowest possible score within the aquatic matrix is 6, the highest is 30, and the range of points is 23. Threshold scores were established by dividing the possible range of cumulative scores into thirds. Each category assigned this way has a range of 8 to 9.

Low = Road segment has a combined numerical value that ranges from 3 to 5.

Moderate = Road segment has a combined numerical value that ranges from 6 to 8.

High = Road segment has combined numerical value equal to or greater than 9.

Table 1: Composite Rating for Aquatic Risk Factors

Road Number	*Geologic Hazard	Stream Crossing Density	Riparian Zone Proximity	Aquatic Risk Composite
13SXX	1	1	1	3
22SXX	3	2	2	7
15SYY	6	3	3	12

\*The geologic hazard was weighted heavier than the other aquatic factors because of the greater risk to the road, and other resources if the road fails, in these areas.

## TERRESTRIAL RISK FACTORS (5)

### 1. Cultural Resources

#### *Description of Indicator*

This factor is based on the extent of risk to recorded heritage sites either directly or indirectly related to the road segment (within 200 ft. of the road). It also considers whether the road itself, because of its' history of development and use, might also be classified as a heritage site. Native American spiritual sites within ½ mile of the road were also considered. Dust, traffic noise and the intrusion of other visitors is considered to have potential adverse impact on Native American spiritual rituals and use of places of religious importance. Data gaps exist. Many roads have never been surveyed for the presence of heritage resources, or had historic value determinations made on them. Conservative risk assessments were made for road segments with little or no heritage resource data. Overall, road segments were rated on the potential that road maintenance/reconstruction, human use and/or vandalism could affect sites. A numeric value is assigned to each road segment based on the following criteria:

- 1 = (Low risk) The road segment is fully inventoried for the presence of heritage resources. There are no known sites in or adjacent to the road that could be damaged due to road work or use. Access to heritage resources vulnerable to illegal artifact collecting and looting is unlikely and there are no known areas of Native American sensitivity near or adjacent to the road.
- 2 = (Moderate risk) The road segment is fully inventoried for the presence of heritage resources. There are no known sites in or adjacent to the road, or those which are known sites are not vulnerable to impact from road work. The road may also provide access to an area with a known high density of sites or isolated sites that are near to but over 200 feet from the road. The road may provide access to illegal artifact collectors and looters. Sensitive Native American use areas may also be accessed from the road.
- 3 = (High risk) One or more known sites are in or immediately adjacent to the road corridor (within 200 feet). These sites could be adversely affected by road use or maintenance. The road may provide looters with easy access to sites, and allow people to drive onto or camp on the sites. Additionally, a high risk road segment may be identified because the road itself may qualify as a heritage resource because of its historic significance or be located

within ½ mile of a Native American sacred site where use of the road has the potential to adversely impact the quality of that use.

## 2. Road Density Effects to Wildlife Habitat

### *Description of Indicator:*

Road density (roaded miles per mile squared):

Wildlife species and habitat quality can be impacted in areas with high road density and use. Potential influencing factors include: direct road related mortality; species road aversion and other behavioral modification; habitat loss, fragmentation and isolation of populations. The type of road (i.e. maintenance level) further contributes to the scale of effects to wildlife. Thomas et al (1979, figure 74) assessed the impacts of traveled roads on the potential effectiveness of summer deer habitat utilizing both road density and maintenance levels (adapted from Perry and Overly 1977). The formula and other background information is discussed in Appendix E of this document. Road density and corresponding maintenance levels per square mile were calculated using arc view, generating a percent value and then placed in the corresponding risk categories:

- 1= (Low Risk) Less than 20 percent decline in habitat effectiveness by roaded miles per square mile.
- 2= (Moderate Risk) Greater than 20 percent and less than 40 percent decline in habitat effectiveness by roaded miles per square mile.
- 3= (High Risk) Greater than 40 percent decline in habitat effectiveness by roaded miles per square mile.

## 3. Scenic Resources

### *Description of Indicator*

This factor is based on the impacts the road segment prism has on scenic integrity. Scenic integrity indicates the degree of intactness and wholeness of the landscape character. Human activity can sometimes raise or maintain integrity. Road segments are rated by the amount of changes in the visibility of the road and effects to the scenic view on the landscape due to road construction or maintenance/ reconstruction.

- 1 = Road segment prism presents few to no impacts to the scenic resource (fits well within the landscape) or presents a slightly altered appearance to the valued landscape character.
- 2 = Road segment prism presents a moderately altered appearance to the valued landscape character.
- 3 = Road segment prism presents a heavily altered appearance to the valued landscape character

## 4. Botanical Resources

### *Description of Indicator*

Since impacts to botanical resources are highly variable and can vary by species and type and season of road use, the mere overlap of roads with these indicators does not inherently indicate an undesired conflict with botanical resources. Risk to botanical resources is highest where the potential for impacts that cannot be mitigated exist.

Botanical Resources are focused on Federally-listed threatened or endangered species and designated critical habitat; species proposed for Federal listing, or proposed critical habitat; Forest Service sensitive species; other plant species of concern, such as forest endemics, and watch list species. This includes the designated botanical areas as well. Native plant communities of concern are also considered that include: wetlands, vernal pools, seeps, springs, peatlands, fens, aspen stands and special soil types such as serpentine or carbonate soils. Roads can impact populations of managed plant species and native plant communities through direct impacts from use, road-related erosion, and fugitive dust impacts to populations. Also, similar to aquatic resources, roads can disrupt and change hydrologic flow and hydrologic characteristics and impact aquatic and wetland species, sometimes a substantial distance downstream of the road impact. In addition, roads can increase the risk of unauthorized collection of native plants. Finally, where known, areas important for cultural uses such as Native American collection sites are also considered, recognizing that disclosure of specific locations is generally protected information.

Road segments are rated by the potential to impact known Federally-listed or Forest Service Sensitive species occurrences, mapped potential or suitable habitat, or mapped critical habitat.

- 1 = Road segment prism presents little potential to impact the known populations of threatened, endangered and Forest Service identified Sensitive plants; mapped potential or suitable habitat; or mapped critical habitat.
- 2 = Road segment prism presents moderate potential to impact the known populations of threatened, endangered and Forest Service identified Sensitive plants; mapped potential or suitable habitat; or mapped critical habitat.
- 3 = Road segment prism presents high potential to impact the known populations of threatened, endangered and Forest Service identified Sensitive plants; mapped potential or suitable habitat; or mapped critical habitat.

## 5. Noxious Weed and Nonnative, Invasive Plants:

### *Description of Indicator*

This factor is based on the impacts the road segment prism has on potential to serve as a vector to spread nonnative invasive plant species (NNIS) that impact native plant communities. NNIS Indicators identify roads or road segments that overlap NNIS populations or contribute to their spread; or roads identified as risks in noxious weed or non-native, invasive species management plans or in sensitive species conservation or management plans.

Road segments are rated by the potential to serve as a vector to introduce or spread NNIS.

1 = Road segment prism presents little potential to serve as a vector to introduce or spread NNIS.

2 = Road segment prism presents moderate potential to serve as a vector to introduce or spread NNIS.

3 = Road segment prism presents high potential to serve as a vector to introduce or spread NNIS.

### Terrestrial Risk Factor Composite Rating

A composite rating of low, moderate and high was assigned to each road segment based on combining values of the terrestrial risk factors. A cumulative score was given from a sum total of all risk factors. The lowest possible score within the terrestrial matrix is 3, the highest is 9, and the range of points is 6. Threshold scores were established by dividing the possible range of cumulative scores into thirds. Each category assigned this way has a range of 2 to 3.

Low = Road segment has a combined numerical value that ranges from 3 to 4.

Moderate = Road segment has a combined numerical value that ranges from 5 to 7.

High = Road segment has combined numerical value equal to or greater than 8.

Table 2: Composite Rating for Terrestrial Risk Factor

Road Number	Cultural Resources	Road Density/ Wildlife Habitat	Scenic Resources	Botanical Resources	Noxious Weeds and Non-native Invasives	Terrestrial Risk Composite
13SXX	1	1	1	1	1	5
22SXX	2	2	2	2	2	10
19SXY	3	3	3	3	3	15

## ACCESS FACTORS (5)

### 1. Private/Non-recreation Public Access

#### *Description of Indicators*

The road system provides access to private landowners and non-Forest Service land managed by other agencies and tribes including Sequoia and Kings Canyon National Parks, Mountain Home State Forest, Public Domain Tracts (Dunlap Band of Western Mono Indians) and the Tule River Indian Reservation. In addition to private lands some roads provide access to facilities authorized by special use permit or other permits for activities including hydroelectric facilities, power lines, communications sites, cattle grazing, resorts, recreation residences, organization camps, and public users for firewood cutting. When the road provides access to other landowners, the Forest Service is obligated to provide for reasonable access. Because of the need to provide and manage this access, this factor is heavily weighted.

- 6 = (Low importance) Road segment does not provide access to non-Forest Service managed land, a special use permit site (power line, communication site, etc.) or other non-recreation public access.
- 3 = (Moderate importance) Road segment serves as an alternate access to non-Forest Service managed land, a special use permit site (power line, communication site, municipal water facilities, etc.) or other non-recreation public access.
- 1 = (High importance) Road segment serves as the primary access to non-Forest Service managed land, a special use permit site (power line, communication site, or municipal water facilities, etc.) or other non-recreation public access.

## 2. Public Access (Recreation)

### *Description of Indicator*

This factor is based on the extent of public recreation use by passenger cars, motor homes, pickups, etc. (such as for camping, hunting/fishing, ohv use, bicycling, etc.) for road segments. Road segments are rated on the type of human uses the segment serves such as access to dispersed or developed recreation sites (campgrounds, trailheads, viewpoints, fee cabin rentals). A numeric value is assigned to each road segment based on the following criteria:

- 3 = (Low importance) Road segment is blocked to use by passenger cars or pickups, or only provides access for seldom used dispersed recreation, or there is no known dispersed recreation and is not a marked OHV route on the monument OHV map.
- 2 = (Moderate importance) Road segment is open to vehicle use and is used for dispersed recreation, or road segment is a secondary route for OHV use and driving for pleasure.
- 1 = (High importance) Road segment serves as the primary access to a developed recreation facility or heavily-used, dispersed recreation site, or road segment is the primary destination for OHV (OSV, 4WD, etc.) use or driving for pleasure.

## 3. Administrative Site Access

### *Description of Indicator*

This factor is based on the extent of Forest Service use for access to administrative sites such as Ranger Stations, rock sources, repeater sites, weather stations, water sources and roads that are classified as arterial. A numeric value is assigned to each road segment based on the following criteria:

- 3 = (Low importance) Road segment does not provide access to Forest Service administrative sites, rock sources, repeater sites, weather stations, water sources and is not classified as a arterial route.
- 2 = (Moderate importance) Road segment serves as an alternate access to Forest Service administrative sites, rock sources, repeater sites, weather stations, water sources and is not classified as a arterial route.
- 1 = (High importance) Road segment serves as the primary access to Forest Service administrative sites, rock sources, repeater sites, weather stations; or road segment is

classified as an arterial route or accesses a water source (water tank at campground, work center, etc.).

#### 4. Vegetation Management

##### *Description of Indicator*

This factor is based on the various access needs to efficiently and effectively manage vegetation. Vegetation management can be used in some areas to reduce fuel levels to reduce the risk of catastrophic fire, protect communities from fire, increase regeneration of giant sequoias and restore groves to desired stand conditions, restore ecosystems to a more natural fire regime of frequent but low intensity fires, and restore other vegetation types, such as plantations, to more natural conditions, or to limit the spread of introduced exotic insects or diseases.

Numerical scores are applied to road segments based on access needs to urban intermix defense zones or threat zones, Strategically Placed Land Area Treatments (SPLATs) or areas of high fire susceptibility, giant sequoia groves, and existing plantations.

- 3 = (Low importance) Road segment provides limited access to areas of high fire susceptibility, urban intermix defense zones or threat zones, giant sequoia groves or existing plantations.
- 2 = (Moderate importance) Road segment provides access to areas with moderate acreage of high fire susceptibility, urban intermix defense zones or threat zones, giant sequoia groves or existing plantations.
- 1 = (High importance) Road segment provides access to areas with high acreage of high fire susceptibility, urban intermix defense zones or threat zones, giant sequoia groves or existing plantations.

#### 5. Fire Protection

##### *Description of Indicator*

Roads are a useful tool in protecting areas from fires. They provide access to areas for detecting fires, and deployment of suppression forces during initial attack and extended attack on wildfires. Roads can be used as fuelbreaks to limit fire spread under low and moderate conditions or for backfiring operations. Roads have often been used as the starting point accessing fuelbreaks and have value in isolating and breaking up the continuity of fuelbeds. Roads have different values for fire suppression due to the position on slope. Ridgetop roads tend to be most useful for firebreaks and defensible firelines. Midslope roads have the least value as firelines, but they often provide access to the defensible locations and are therefore still important. Well-maintained roads located in or in close proximity to communities are important for suppression resources to maneuver while protecting homes and maintaining firefighter safety. Public and commercial road access can lead to increased ignitions; this effect is highly variable from district to district.

Numerical scores are assigned to road segments based on position on slope and continuity of fuelbeds, on whether the road provides access to facilities or private property to be protected, and whether there is a high incidence of ignitions.

- 6 =(Low importance) Segment is midslope with little holding value for initial attack or extended attack, and does not provide access to roads with good holding value. The segment does

little to isolate or break up the continuity of fuels in the area. The segment is not important for protection of facilities or private property.

3 = (Moderate importance) Segment is midslope or ridgetop with some holding value for initial attack and/or extended attack, and provides alternate access to roads with good holding value. The segment is useful in breaking up continuity of fuels. The segment may or may not be important for protection of facilities or private property.

1 = (High importance) Segment is ridgetop or close to ridgetop with good holding value for initial attack and/or extended attack, or provides extensive access to roads with good holding value. The segment is very useful in breaking up continuity of fuels. The segment is important for protection of facilities or private property. This segment is important for firefighter and public safety.

### Access Composite Rating

A composite rating of low, moderate, or high importance is assigned to each road segment for access factors based on the following criteria:

Low = A numerical sum of 20-27 for Private, Public Transportation, Administrative, Vegetation Management or Fire Protection Access for the road segment.

Moderate = A numerical sum of 12-19 for Private, Public Transportation, Administrative, Vegetation Management or Fire Protection Access for the road segment.

High = A numerical sum of 5-11 for Private, Public Transportation, Administrative, Vegetation Management or Fire Protection Access for the road segment.

A high rating indicates high demand for the road and, conversely, a low indicates little demand.

**Table 3: Composite Rating for Road Access Needs**

Road Number	*Private use/ Public transport	Recreation Access	Admin. Site Access	Veg. Mgt. Access	*Fire Protection	Access Composite
13SXX	1	1	1	1	1	5
22SXX	3	2	2	2	3	12
15SYY	6	3	3	3	6	27

\*Both Private use/Public transportation and Fire Protection are weighted heavier than the other access factors for specific reasons. The Forest Service is required to provide reasonable access to private property that is surrounded by National Forest System lands, for this reason the Private use portion was rated heavier. In addition, the need to protect forest ecosystems, and private and public facilities from catastrophic fire is an important issue.

## SOCIAL FACTORS (2)

### 1. Lifestyle, Attitudes, Beliefs & Values

#### *Description of Indicator*

This factor is based on the extent the road system may affect human lifestyles, attitudes, beliefs, and values. Lifestyles include employment, traditional uses, hobbies, and spiritual practices; attitudes, beliefs, and values include cultural values, significance of sequoias, other values of the road including access to special places, and the desire to maintain access to *their* public land. More specifically, this factor looks at the positive aspects of roads for the individual and the community. It analyzes the importance of a road for a variety of needs such as: access to areas for environmental and historical education and interpretation, psychological well-being, stress relief, solitude, desire to be in a natural setting, spend time with family, and access for the general public's other perceived needs and values of the forest. Access to Native American gathering and cultural sites are included here.

#### *Lifestyle*

- 3 = (Low importance) Road segment is not used for employment reasons, or traditional uses nor are there any known uses related to personal hobbies or spiritual values associated with the road.
- 2 = (Moderate Importance) Road segment is used occasionally for employment, means to earn a living, or traditional uses; or personal hobbies are pursued and/or spiritual values occur.
- 1 = (High Importance) Road segment is used for regular employment, traditional use, hobby or spiritual practice.

#### *Attitudes, beliefs, and values*

- 3 = (Low imp.) No desires expressed to retain road segment.
- 2 = (Moderate imp.) Moderate value given to road segment (Access for sake of maintaining access to National Forest). Access to a special place may be provided to a limited number of visitors.
- 1 = (High imp.) High demand expressed for road segment with consistent desire to access special place(s).

### 2. Economics by Road Maintenance Level

#### *Description of Indicator*

This factor is based on our ability to maintain the existing road system with the current budget. The arterial (ML 5) and collector roads (ML 4) are generally paved and these roads must be maintained to a high standard; however, paved roads are much more expensive to maintain than native surfaced roads. The collector roads (ML 3) are open to the public and must be maintained by law (Highway Public Safety Act) to a minimum safe standard. The forest annual road maintenance budget has been on a decline in recent years and the allocated maintenance funds are not sufficient to maintain the entire forest road system.

- 3 = (Low imp.) Road segment is closed or is accessible only by high clearance vehicle. ML is 1 or 2.

2 = (Moderate imp.) Road segment consists primarily of native surfacing and is listed as an operational ML 3 road. These road segments are open for public use and travel.

1 = (High imp.) Road segment is all paved; ML 4 or 5.

### Social Composite Rating

A composite rating of low, moderate, or high importance is assigned to each road segment for social factors based on the following criteria:

Low = A numerical value of 7-9 for economic, lifestyle, attitudes, and beliefs values for the road segment.

Moderate = A numerical value of 5-6 for economic, lifestyle, attitudes, and beliefs values for the road segment.

High = A numerical value of 3-4 for economic, lifestyle, attitudes, and beliefs values for the road segment.

A high rating indicates low values for the road and, conversely, a low indicates high value.

Table 4: Composite Rating for Social Values

Road Number	Lifestyle	Attitude, Belief, Values	Economics	Social Composite
13SXX	1	1	1	3
22SXX	2	2	2	6
15SYY	3	3	3	9