Chapter IV

Environmental Consequences

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IV. Environmental Consequences

This chapter describes the probable consequences or effects of each alternative on each resource. Three types of effects will be discussed by alternative: direct effects, indirect effects, and cumulative effects. The description of effects is the scientific and analytic basis for comparing the alternatives.

The resource components are divided into three categories, as follows:

- Resource Management
  - Air Quality
  - Caves
  - Fire and Fuels
  - Geology and Soils
  - Giant Sequoia and Mixed Conifer
  - Range
  - Rare Plants
  - Noxious Weeds
  - Watershed
  - Wildlife
- Human Use
  - Heritage Resources
  - Recreation
  - Scenic Environment
  - Socio-Economics
- Transportation
  - Roads

A. Assumptions

Chapter II (in the Treatments section) describes the general treatments that were modeled by computer to approximate both the acres that might be treated by decade with those treatments as well as what landscape-level effects would occur as a result of those treatments. The SPECTRUM landscape computer model was used to help quantify these effects. The results were used by the interdisciplinary team to help identify probable effects for each alternative and to help distinguish differences in effects between alternatives.

This section describes the assumptions used to estimate the number of acres that would be treated per year. The number of acres treated per year is based on program manager recommendations of what would be feasible (given recent budgets and program of work) under each alternative. They were used as upper limits during the modeling.

1. Key Modeling Assumptions

- Wildfire would continue to burn portions of the Monument, with the projected annual rate based upon historical data and the projected amounts based upon landscape computer modeling.
- Most treatments in the first two to three decades would be to implement protection strategies for communities and other key resources, a priority consistent with the Framework and supported by many members of the public, both locally and nationally. Initial treatments to implement protection strategies would be completed in approximately 20 years in Alternatives 1, 2, 5, 6, and Modified 6, and in approximately 10 years in Alternatives 3 and 4.
- As the initial treatments to implement protection strategies are completed, the emphasis would shift to treatments to implement restoration strategies and maintenance treatments (re-treatment of areas already treated to maintain desired fuel conditions and to restore a frequent fire return interval).
- Spatial locations of treatments used in the modeling were estimated by interdisciplinary team members and based on their local professional experience. Key resources (e.g., wildlife habitat, giant sequoia groves) and site conditions (e.g., slope, proximity to roads) were considered. Actual treatment types and locations will be determined by site-specific NEPA analyses tiered to this plan.

2. Number of Acres Treated

Table IV-1 displays the approximate number of acres that would be treated in each alternative, as estimated by computer modeling. For a breakdown by treatment method for each alternative, see Table II-4, Comparison of Alternatives by Treatment Methods. For more information on the computer modeling used for the Monument Plan, see Appendix H.

Table IV-1: Number of Acres Treated by Alternative (approximated by computer modeling)

Alternative	1st Decade	2nd Decades	20-yr Total	50-yr Total*
1	42,370	64,490	106,860	302,710
2	41,830	59,190	101,020	281,020
3	59,000	60,000	119,000	396,620
4	59,000	60,000	119,000	404,550
5	70,000	50,000	120,000	336,990
6	79,900	66,000	145,900	370,860
Mod 6	63,840	69,880	133,720	338,450

*The amount of acres treated in 50 years is greater than the total acres in the Monument because the treated acres include all of the areas for re-entry and maintenance treatments.

B. Resource Management

1. Air Quality

a) Emissions From National Monument Activities.

Smoke from prescribed burning and wildland fires could potentially affect air quality and is a concern because of its potential effect on human health and visibility. The smoke could potentially affect visitors to the Monument and residents in surrounding communities.

Prescribed Burning. When considering the use of prescribed burning to restore the natural role of fire in ecosystems and reduce fuels, the effects of smoke from wildfire and prescribed burning must be considered. Fires emit large amounts of particulate matter (PM-10 and PM2.5) and carbon monoxide, as well as nitrous oxides (NOx) and volatile organic compounds (VOCs), which are precursors to ozone. Other constituents of smoke (gases and chemicals) might also enter the lungs. Some components, such as benzo-apyrene and aldehydes, can be carcinogenic.

Wildfires result in greater emissions per acre when compared to prescribed burns, commonly exceeding ambient air quality standards. They also often occur under conditions of high temperature and low humidity, when high concentrations of ozone are most likely. Prescribed burning reduces existing fuels, thus decreasing the fire hazard and the risk of high intensity wildfire, and decreasing the quantity of fuels available to be consumed in a wildfire. However, infrequent large-scale wildfire will still occur naturally in some vegetation types. There are concerns about the amount of smoke and how it will disperse and whether the prescribed burns would result in fewer impacts to air quality than would occur with a wildland fire.

The quantity of smoke emissions from fires and the impact of those emissions on local and regional air quality vary dramatically with the size and type of fire that occurs. The number of acres burned is the single most important factor in determining the total emissions within an airshed. Large fires, whether they originate as wildland fires or prescribed fires, produce more total emissions than small fires. Therefore, reducing the total acreage burned, regardless of the type of fire, is the most effective way to reduce the total emissions within an airshed.

The fire type also influences the quantity of emissions from fire. Prescribed fires typically produce lower per-acre emissions than wildland fires. Heading fires (a fire that burns with the wind) typically produce lower per-acre emissions but have higher emission rates than backing fires, and surface fires typically produce lower per-acre emissions than crown fires. The differences in emissions among the different fire types might be attributed to differences in the meteorological conditions that typically occur, differences in fuel properties, and differences in the resultant fire behavior and fuel consumption. Because prescribed fire generally produces fewer per-acre emissions than wildland fire, it is possible to burn more acres with prescribed fire than would normally occur with wildland fire and still maintain the same total emissions within an airshed.

The primary benefit of a prescribed fire program is in modifying the sizes and types of fires that occur within a particular geographic region. With prescribed fire, it is possible to replace large, high-intensity wildland fires characterized by high fuel consumption and high total emissions with smaller, lower-intensity prescribed fires characterized by lower fuel consumption and lower total emissions. But this decrease in wildland fire emissions typically comes at the expense of higher prescribed fire emissions.

The higher the total emissions (wildland fire plus prescribed fire) within an airshed, the greater the air quality impacts. However, air quality impacts are measured in terms of air concentrations and not in terms of total emissions. Air concentrations are a function not only of the total emissions within the airshed, but also of the timing of the emissions, the locations of the fires relative to sensitive receptors, the meteorology of the area, and the physical characteristics of the smoke plume. Prescribed fires, while they generally produce lower total emissions than wildfires, are also lower in intensity than wildfires, with lower total heat production and lower plume rise. This difference can often lead to higher smoke concentrations at locations far from the source than from a wildland fire of the same size.

Public Health. Pollutant concentration is the primary issue related to public health. In all alternatives, prescribed fire would be limited to allocations issued by the San Joaquin Valley Air Pollution Control District. These allocations are dependent on the ability of smoke to disperse on a given day and the potential for public exposure and subsequent health impacts. The Forest Service and the San Joaquin Valley Air Pollution Control District have improved the communications and reporting necessary to coordinate efforts and reduce public exposure.

Evaluation Criteria. The air quality impacts of the alternatives are evaluated on the basis of the following criteria:

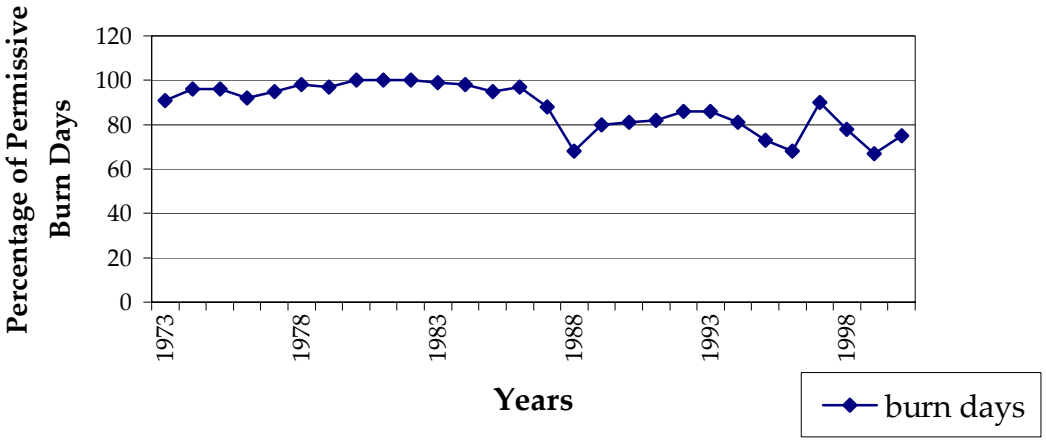
- Capability to conduct prescribed fires in the regulatory environment. A retrospective analysis was completed using a 28-year record of annual burn day summaries and a 4-year record (1998 to 2001) of daily burn day designations. The annual summary record was used to establish trends. The daily record was used to examine monthly variation, establish multiple day burning opportunities, and compare burn day variation with typical prescribed fire prescriptions. Fuel moisture records for the same 4-year daily burn day record were examined to identify when prescribed fire prescriptions and allowable burn days coincide.
- Total emissions of fine particulate matter less than 10 microns in aerodynamic diameter relative to the alternatives. Both wildland fire and prescribed fire emissions are displayed by annual average for the first decade.

b) Retrospective Analysis of Burn Days.

Burn day designations within the Monument are currently designated by the San Joaquin Valley Air Pollution Control District (District). Until recently the California Air Resources Board (CARB) has provided this service. The data used for the retrospective analyses were based on burn day designations historically provided by CARB. Annual summaries were used to establish trends and daily records from 1998 to 2001 were used to look at monthly variations.

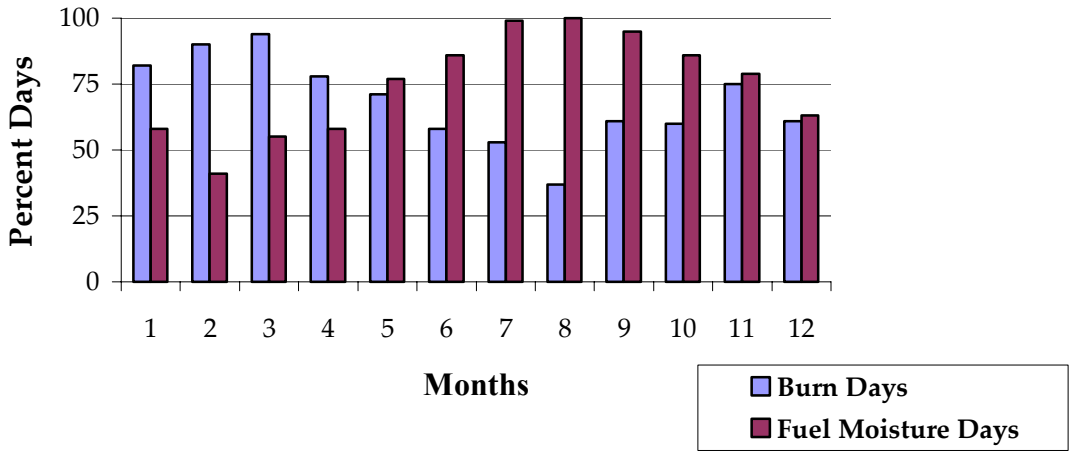
An examination of CARB burn day records from 1973 to 2000 suggests that designated burn days have declined in the Monument since 1973 (Figure IV-1). Up to about 1988, over 95% of the days each year were permissive burn days. From 1988 to 2000, the number of permissive days has been just under 80%. Even though burn days have declined since 1973 a fairly high percentage of days remain available. The District is planning to develop a burn day designation process that will involve dividing the District up into zones. More refined meteorological data is expected to provide better forecasting and the ability to differentiate “burn” and “no burn” designations at a zone scale. This process could provide more burn day designations in the Monument.

Figure IV-1: Burn Days 1973 to 2000

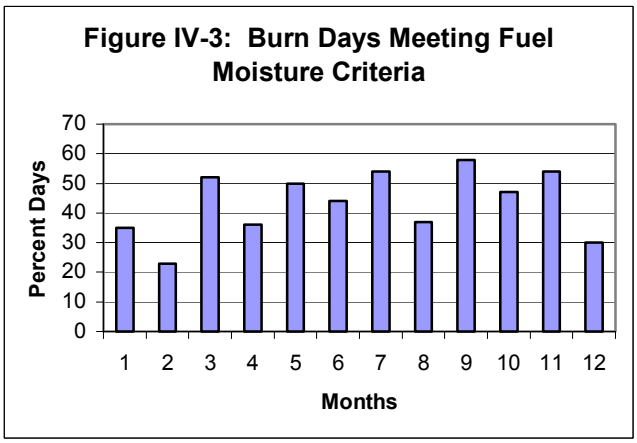


Available burn days only provide the information needed to minimize the potential for smoke impacts. The Forest Service has many other criteria that must be met prior to ignition of a prescribed burn project. One of the principal criteria is fuel moisture. Days meeting fuel moisture criteria and designated burn days for 1998 to 2001 were examined to better understand how they might constrain prescribed fire in the Monument (Figure IV-2). The number of designated burn days tends to start high in January and peak in March. There is a considerable drop from April to August and then a slight increase from September to December. The number of days when fuel moisture criteria is suitable for prescribed burning is at its lowest in January and February and conversely picks up in the spring months. Conditions are normally too dry for burning after May and remain that way until about September. Generally the data suggest that in early spring fuel moisture is more constraining than permissive burn days and in the fall permissive burn days are more constraining than fuel moisture.

Figure IV-2: Burn Days vs. Days Meeting Fuel Moisture Criteria

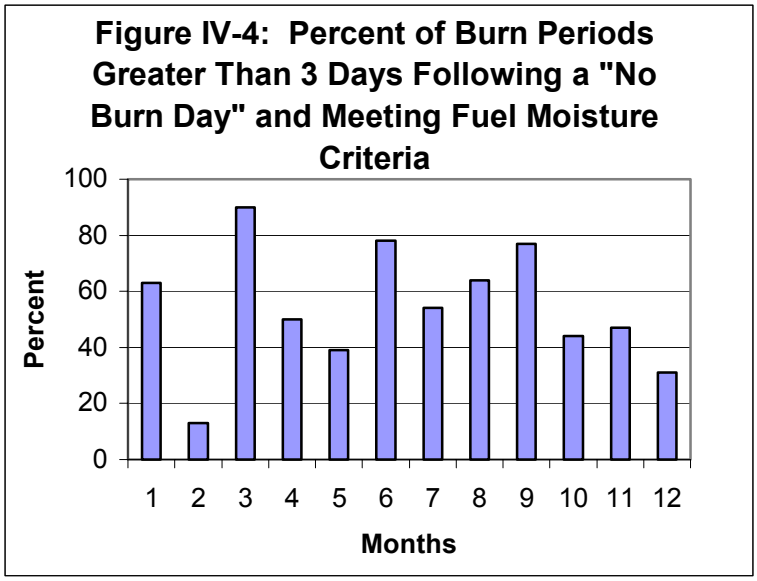


Both fuel moisture records and burn day designations for the 1998 to 2001 period were used to examine monthly variation in permissive burn days that met fuel moisture criteria (Figure IV-3). The data suggest slightly more days meeting both criteria in the fall burn period than in the spring period. The traditional burning period in the spring (March, April, May) averages about 45% of the days meeting criteria. The traditional burning period in the fall (September, October, November) averages over 50% of the days meeting criteria.

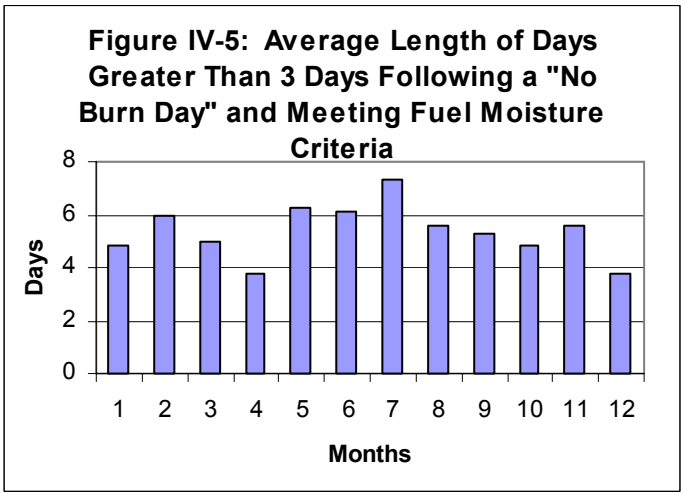


Another factor that could limit prescribed fire application would be the availability of consecutive burn days meeting a prescription for larger projects that might take multiple days to complete. The 1998 to 2001 data was examined to better understand the opportunities for multiple day projects. The frequency (%) of burn periods following a no burn period that would extend at least 3 days is displayed in Figure IV-4. Fuel moisture criteria are integrated as well. Coordination with the San

Joaquin Valley Air Pollution Control District staff might allow better predictions of these periods.



Of those periods that exceeded 3 days, the average length was 4½ days. The monthly variation in the average length of days exceeding 3 days is shown in Figure IV-5. These data tend to indicate that sufficient opportunity exists to complete the prescribed fire objectives in each alternative. The more complex issue may be one of public acceptance of smoke, which is discussed in more detail in the section on Smoke and Public Nuisance below.



c) Air Quality Impact Assessment

Table IV-2 presents, by alternative, the predicted annual average PM-10 emissions for prescribed fire in the first decade and annual averages thereafter. Emissions are expressed in annual tons. Air quality emissions related to smoke are based on fire

and fuels modeling as well as average emission characteristics for a variety of vegetation, fuel loading, and fuel consumption conditions in the Sierra Nevada. Uncertainty is inherent to this process and can be affected by climatic variation. However, the confidence in evaluating the relative differences between alternatives is high.

Table IV-2: Predicted PM-10 Emissions

	PM-10 Underburn (tons/yr)	PM-10 Piles (tons/yr)	PM-10 Total (tons/yr)	Volume of Wood Products Removed Annually (million cubic feet/million board feet)	Estimate of Emissions Savings (tons/yr)
Alt 1: 1st decade	205	240	445	1.0/5.0	144
Alt 1: Decades 2-5	370	0	370	0.2/1.0	29
Alt 2: 1st decade	140	240	380	1.0/5.0	144
Alt 2: Decades 2-5	305	0	305	0.2/1.0	29
Alt 3: 1st decade	695	160	855	0.2/1.0	29
Alt 3: Decades 2-5	795	0	795	.04/0.2	6
Alt 4: 1st decade	730	160	890	0/0	0
Alt 4: Decades 2-5	830	0	830	0/0	0
Alt 5: 1st decade	590	510	1,100	1.0/5.0	144
Alt 5: Decades 2-5	930	0	930	0.2/0.7	29
Alt 6: 1st decade	420	620	1040	2.0/10.2	287
Alt 6: Decades 2-5	850	0	850	0.3/1.4	43
Mod Alt 6: 1st decade	300	137	437	1.5/7.5	215
Mod Alt 6: Decades 2-5	254	0	254	1.3/6.4	187

Each alternative would have some pile burning in the first decade in anticipation of mechanical treatment in the urban defense zone. This would be an extremely important element in effectively spreading the emissions over more time since the pile burning could be accomplished during winter months. Alternatives 1, 2, 3, 5, 6, and Modified 6 could remove some volume of wood products prior to burning; that would represent an emissions savings. In Alternative 4, this material would be burned.

The ranking of each alternative in terms of PM-10 produced in the first decade is shown in Table IV-3. The ranking that displays underburns is important since this material is would be burned primarily in the more critical spring or fall burn periods. The material burned in piles would be a candidate for winter burning and therefore removed from the more constraining seasons. Alternatives 1, 2, 3, 5, 6 and Modified 6 could remove some volume of wood products prior to burning; this tonnage was removed from the fuel loadings in the PM-10 estimates. Alternatives 1 and 2 would result in the least PM-10 emissions in the short and Modified Alternative 6 would result in the least in the long term. Rankings of PM-10 emissions after the first decade are displayed in Table IV-4.

Table IV-3: Alternatives Ranked by PM-10 Produced

Alternative(s)	Ranking of PM-10 Emissions by Alternative for Underburns in 1st Decade (tons/yr)	Alternative	Ranking of PM-10 Emissions by Total (underburns + piles) in 1st Decade (tons/yr)
2	140	2	380
1	205	Mod 6	437
Mod 6	300	1	445
6	420	3	855
5	590	4	890
3	695	6	1,040
4	730	5	1,100

Table IV-4: PM-10 Emissions After the First Decade

Alternative(s)	Ranking of PM 10 Emissions After 1st Decade (tons/yr)
Mod 6	254
2	305
1	370
3	790
4	830
6	850
5	930

Wildfire emissions are displayed in Table IV-5. Emissions decrease over time as wildfire and prescribed fire projections begin to affect the potential.

Table IV-5: Wildfire Emissions

Alternative	PM-10 Emissions in 1st Decade (tons/yr)	% Decrease in PM-10 Emissions by 5th Decade
1	3205	36%
2	3190	33%
3	3115	40%
4	3130	42%
5	3190	37%
6	3140	45%
Mod 6	2810	45%

d) Cumulative Effects

The regulatory framework (Title 17) that controls agricultural and wildland prescribed fire in California is designed to control cumulative effects through allocations based on meteorological conditions influencing smoke dispersion. The Sequoia National Forest and other cooperating wildland agencies work closely with the San Joaquin Valley Air Pollution Control District and the California Air Resources Board to prioritize wildland prescribed fire within the emissions constraints allowed by the regulatory agencies. Under this regulatory structure cumulative effects would not be expected to occur.

e) Smoke and Public Nuisance

The regulatory environment for smoke has shown an overall emphasis on accommodating prescribed fire out of recognition of the severe fuels risk in the western United States. In California the public nuisance rule provides an important protection measure for property, safety and health. However, this rule can have a very unpredictable impact on prescribed burn programs.

In response to the California Code of Regulations the District enacted Rule 4102. This is the Nuisance Rule that was adopted May 21, 1992 and amended December 17, 1992. This rule essentially requires the District to investigate and take action to remedy any air discharge that is causing injury, detriment, nuisance, or annoyance to any considerable number of persons.

Good smoke management techniques, improved burn day forecasts and public communication can mitigate some complaints. Public nuisance issues are more commonly associated with changing or unforeseen conditions in the burn day forecast or lower elevation projects where the smoke is not fully dispersed during daytime hours. Although difficult to predict, it is probably safe to assume that the

impact of public nuisance calls on prescribed fire projects would increase, given growing populations in the foothill areas on the west side of the Monument. Alternatives 3, 4, 5, and 6 have the highest likelihood of triggering public nuisance complaints.

2. *Caves*

a) All Alternatives

Under all alternatives, caves and their associated resources would be inventoried, protected, studied, and preserved. All of the alternatives include some form of vegetation management, prescribed burning, road maintenance, recreation use and management, and other management activities. These activities could affect air quality, groundwater chemistry, and sediment levels in caves. In addition, cave resources that include cave fauna and flora, speleogens, speleothems, paleontological, and archaeological resources could be affected. As cave inventories are completed, risks to unknown caves would decrease, knowledge of cave resources and their conditions would increase, and the potential for additional recreational opportunities in caves could increase.

Vegetation Management. The result of vegetation treatments would be disturbance to the soil in the form of reduced soil porosity (soil compaction) and decreased ground cover. During rainfall and snowmelt events, erosion could accelerate and sediment delivery rates could increase. Increased sediment rates in areas that drain into caves could result in additional sediment deposits over and beyond the normal range of deposition in cave systems. Cave systems could become inundated with sediment and cave resources could be damaged. Habitat for cave flora and fauna could be changed and result in lower populations. The potential risk to caves of known location from sedimentation is low. Known caves would be identified and protected from impacts. The effects to unidentified caves are unknown.

Wildfire and Prescribed Burning Wildfires and prescribed fires might leave some areas with reduced ground cover, increase the potential for soil erosion, and change the biogeochemistry of soil and organic matter. During rainfall and snowmelt events, erosion could accelerate and increased sediment and residual matter from the fire would be transported. Some of this transported residual matter could enter and deposit in cave systems. Sediment could deposit in cave channels and inundate cave resources. In addition, the biogeochemistry of sediment and residue might be changed as a result of fire. This change in the biogeochemical characteristics of sediment and residue and its effect on cave resources is unknown at this time.

There is a possibility that smoke from wildfires or prescribed fires could move through a cave system and impact cave resources. Fire near cave entrances could result in scorching, cracking, and failure of the rock surface at the cave entrance. Smoke or cracking rock could result in negative impacts to cave resources such as

the flora and fauna living in caves and the petroglyphs near cave openings, as well as reducing access to caves for cave dwelling wildlife, recreation, or research.

Prescribed fires are planned to burn with low intensity, resulting in limited effects on soil. Wildfires burn with varying intensities and are more likely to burn at high intensity, leaving soils more exposed to soil erosion.

The potential risk to caves of known location from prescribed fire is low. Known caves would be identified and protected from impacts. The effects to all caves from wildfire are unknown. The risk to unidentified caves from prescribed fire or wildfire is unknown.

Recreation. Recreation operations with the potential to affect caves include cave exploration that could cause damage to karst features, fauna, and flora. Encouraging more people to use trails in the vicinity of caves could result in unauthorized access into caves. This unauthorized access could negatively impact cave resources.

Indirect effects might result from the development of recreation or administrative facilities by altering water flows or increasing sedimentation near caves. If septic systems are used in recreation or administrative facilities to treat human waste ground water that moves through caves could be contaminated. This contaminated groundwater could negatively impact cave resources. The potential risk to caves of known location from recreation use or facility development is low. Known caves would be identified and protected from impacts. The effects to unidentified caves are unknown.

3. Fire and Fuels

a) All Alternatives

Under all alternatives, the following direct effects would occur:

- Treatments in the chaparral vegetation type would provide an increase in the variety of age classes of vegetation and begin moving this type towards desired conditions. Fire susceptibility would be reduced in the chaparral ecosystem.
- Fire would be re-introduced in fire-dependent ecosystems.
- Fuel loading and fire susceptibility would be reduced, leading to a decrease in the risk of loss from catastrophic fire across the landscape. There would be a reduction in surface and ladder fuels.
- The density of ladder fuels would be reduced and surface fuel loadings would be reduced (USDI National Park Service, Sequoia and Kings National Park, 2001).

Under all alternatives, the following indirect effects would occur:

- Vegetative heterogeneity would increase as different age classes and sizes are established, leading toward a condition that is more supportive of a low-intensity surface fire and a more frequent fire return interval.
- Treatment in chaparral vegetation would reduce the ability of fires to move from the chaparral to the mixed conifer ecosystem.
- Over time, large trees over 30 inches in diameter would increase, as thinning by prescribed burning, wildland fire use, or mechanical treatments begins to reduce stand densities. These trees can more easily survive the effects of wildfire than smaller trees.
- Approximately 13% of the Monument contains protected habitat for wildlife species dependent on old forest conditions, such as the California spotted owl and furbearers. Fire susceptibility would be reduced to varying degrees in areas treated to implement protection strategies, dependent upon the alternative. Fire susceptibility could also be reduced in other areas, however not to the same extent as areas that do not have as many constraints applied. For example, only 10% of protected activity centers can be treated per decade. Most treatments would be limited to treatment of surface fuels and very small trees. The result would be a tendency for wildfires to remain as ground fires in these areas. However, a continuous overstory canopy contributes to severe crown fires, and these limited understory treatments would not reduce the canopy. Wildfires occurring within this wildlife habitat would be more likely to result in severe effects than in areas where more treatments are allowed. Outside of these key habitat areas, strategically located treatments could help reduce the extent and magnitude of wildfires before they reached these areas.
- The risk of escaped prescribed fire would be low in all alternatives.

The discussion of effects is based on the acres displayed in Table IV-1, which displays the estimated treatment acres by alternative for the first two decades and the first 50 years.

(1) Fire Susceptibility

Fire susceptibility is an indicator of large severe fire or catastrophic fire. Areas of high and moderate fire susceptibility have higher potential under high fire danger weather conditions to result in catastrophic fire than areas of low susceptibility. Approximately 30 to 40 percent of each landscape within the Monument would need to be treated in strategic locations to move towards low fire susceptibility (Finney, 1999; USDA Forest Service, 2001). Table IV-6 displays the percentage of the Monument in each class of fire susceptibility. During the first decade, all

alternatives would reduce fire susceptibility, as shown in Table IV-7. The rate of accomplishing this would vary among alternatives.

Table IV-6: Fire Susceptibility Classes

Fire Susceptibility Classes				
High	**Moderate**	**Low**	**Barren**	**Total**
31%	58%	8%	3%	100%

Table IV-7: Acres of Moderate and High Susceptibility Treated by Alternative in the First Decade

	Alt 1	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**	**Mod Alt 6**
Acres of Moderate and High Susceptibility	42,370	41,830	59,000	59,000	70,000	79,900	63,840

Table IV-7 shows that Alternatives 5, 6, and Modified 6 would reduce fire susceptibility the most compared to the other alternatives during the first decade. Alternatives 3 and 4 would treat almost equal amounts and would treat less than Alternatives 5, 6, and Mod 6. Alternatives 1 and 2 would treat the least acres of moderate and high susceptibility. This difference is due to Alternatives 1 and 2 not having protection or restoration strategies outside of the wildlife urban intermix, resulting in fewer treated acres.

Alternative 3's restoration strategy initially focuses around and in support of defense zones. The management goal of restoring ecosystems outside the defense zones would be responded to by emphasizing natural processes, primarily fire. Treating defense zones would be the priority and completed first. Community protection is tied to the fire manager's ability to treat areas adjacent to defense zones so they can support defense zones. Alternative 4 would use defense zones around communities and along major roads for protection. Success would be tied to completion of restoration treatments. The restoration strategies for Alternatives 3 and 4 would support defense zones by using a more natural process to reduce fire susceptibility.

Alternatives 5 and 6 propose the same protection strategies in the wildland urban intermix as Alternatives 1 and 2, but their treatments to implement restoration strategies would also help reduce fire susceptibility. Modified Alternative 6 proposes the same protection strategies in the wildland urban intermix as Alternatives 1, 2, 5, and 6, and also has focused fuel reduction treatments for the protection of giant sequoia groves.

In the first two decades, Alternatives 1 and 2 would be the least effective in reducing susceptibility, as an estimated 101,000 to 105,000 acres would be treated. Alternatives 3, 4, and 5 would each treat approximately 120,000 acres, and Modified Alternative 6 would treat 134,000 acres. Alternative 6 would be the most effective, as an estimated 146,000 acres would be treated.

The reduction in fire susceptibility for the different alternatives is predicted to lead to a reduction in the amount of stand-replacing fires over the short term (first two decades) and over the long term. Table IV-8 shows the predicted acreage of stand-replacing fire by alternative. Over 50 years, Alternatives 6 and Modified 6 show substantially fewer acres of stand-replacing fire than the other alternatives.

Table IV-8: Estimated Cumulative Acreage of Stand-Replacing Fire by Alternative

Alternative	First 20 years	First 50 years
1	9,720	18,450
2	10,600	24,320
3	10,950	21,800
4	10,800	21,320
5	10,920	23,220
6	9,140	15,720
Mod 6	8,280	12,780

(2) Fire Return Interval Departure

Fire as a natural process has been limited by humans in the Monument for almost 100 years, resulting in a change of density, configuration, and amount of fuels from historical levels. Table IV-9 shows the existing fire return interval departure in the Monument. “Departure” is a deviation from the historic fire return interval. The more intervals missed, the farther the current fire regime is from the historic fire regime. “Extreme” is greater than 5 departures from the historic fire interval; “High” is between 2 and 5 departures; “Moderate” is between 1 and 2 departures; “Low” is 1 or less and is within the historic fire return interval (see Figure III-6 in the Map Packet).

Table IV-9: Fire Return Interval Departure Classes

	Extreme	High	Moderate	Low	Barren/Rock
Percent Existing in Monument (Acres)	62% (202,370)	5% (16,320)	24% (78,335)	8% (26,110)	1% (3,265)

All alternatives would re-introduce fire into the ecosystem; however, the rate at which the Monument would move toward historic fire return intervals would vary by alternative, as shown in Table IV-10.

Table IV-10: Acres That Would Move Toward Their Historic Fire Return Interval in the First Decade

Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Mod Alt 6
42,370	41,830	59,000	59,000	70,000	79,900	63,840

Table IV-10 displays that Alternatives 1 and 2 would be the least effective in moving acres toward the desired condition, as no explicit restoration strategies are found in these alternatives and progress would primarily be made as a result of protection strategies. Alternatives 3 and 4 would be the second least effective, as they would combine restoration strategies with limited community protection strategies. Alternatives 5 and Modified 6 would be the next most effective and Alternative 6 would be the most effective.

(3) Spot Fire Potential

Figure III-6 (in Chapter III) shows that alternatives using the community protection strategy from the Framework (including defense zones, threat zones, and SPLATs) would be the most effective in limiting the potential of firebrands to loft into sensitive areas. Modified Alternative 6 would provide the widest range of tools and result in the most acres treated around communities and groves, resulting in the least likelihood of firebrands falling in the wildland urban intermix. Alternative 6 would be the second most effective. It would protect communities like Modified Alternative 6, but it does not propose a specific protection strategy for the groves. Alternative 5 would be the third most effective, with Alternatives 1 and 2 fourth and fifth most effective.

Alternative 3 would treat more acres than Alternatives 1 and 2. Its use of a defense zone ranging from 200 foot to ¼-mile is similar to the Framework community protection strategy. Alternative 3 relies on only prescribed fire and hand treatments to support its defense zones. This emphasis on prescribed fire treatments outside the defense zone makes Alternative 3 the second to the least most effective in limiting the potential of firebrands to loft into sensitive areas. This would result from limiting the use of mechanical methods to manipulate fuels to modify fire behavior during prescribed burns or wildfires. Alternative 4's limited protection strategy would make it the most difficult option for prescribed burn implementation and the least effective in reducing the number of fire brands lofted into the sensitive areas from wildfires. The analysis of spot fire potential (see the Fire and Fuels section of Chapter III) shows that a community protected by a defense zone only ¼ mile in width would still be at risk from firebrands generated by fires outside the defense zone. Using a defense zone only 200 feet wide, as in Alternative 4, would increase this risk.

(4) Condition Class

Condition Class is based upon the Fire Return Interval Departure, or time since the last fire. Therefore, the same consequences to the fire return interval departure would apply to condition class. Table IV-11 shows that Alternatives 1 and 2 would be the least effective in moving acres towards the desired condition, as no explicit restoration strategy is found in these alternatives and progress would primarily be made as a result of protection strategies. Alternatives 3, 4 and 5 would be the second least effective, as they would combine restoration strategies with limited protection strategies. Modified Alternative 6 would be the second most effective in restoring fire to the ecosystem. Alternative 6 would be the most effective.

Table IV-11: Summary of Changes to Condition Class by Alternative

Condition Class	% of Monument	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Mod Alt 6
2 & 3	90	59	60	55	55	55	46	50
1	10	41	40	45	45	45	54	50

b) Alternatives 1, 2, and 5

These alternatives would be very similar in their effects because the management direction is similar, except that in Alternative 5, in the giant sequoia groves, greater flexibility is provided to manage vegetation. Alternatives 1 and 2 would treat less than Alternative 5 because they don't have the restoration strategy. In the first two decades, Alternative 5 would treat almost 20,000 more acres. Alternatives 1, 2, and 5 would not provide as much flexibility in their management strategies or expected treatment acres as do Alternatives 6 and Modified 6 to create stands that are closer to the desired conditions. Wildlife habitat structural components could be maintained with greater certainty and timely treatments could be implemented to protect communities and objects of interest.

These alternatives would meet the goal of reducing risk from catastrophic fire and would enhance fire suppression capabilities by modifying fire behavior inside the wildland urban intermix zone, particularly in the first two decades. As restoration projects are completed, benefits would increase. Strategically placed area treatments would be completed within the threat zone to support firefighting efforts in the defense zone for protection of communities. Within the defense zone of the wildland urban intermix, areas would be treated to move toward or maintain the desired condition. In Alternative 5, where giant sequoia groves overlap the wildland urban intermix, more protection would be provided because of the greater flexibility to reduce canopy and shift the stand structure toward one that would support a low-intensity surface fire. Giant sequoia groves would be likely to receive greater protection from catastrophic fire in Alternative 5 because more acres would be treated than under Alternatives 1 or 2. Alternatives 1, 2, and 5 all have an extensive

strategy for protection of communities. However, the mechanical and prescribed fire treatments would not provide the same degree of protection as Alternatives 6 and Modified 6, because more acres would be treated in these alternatives and greater flexibility given in managing fuels and fuels both in and outside of the groves.

In approximately two decades, fire susceptibility would be reduced in the wildland urban intermix by strategically placing fuel treatments in the defense and threat zones. Most giant sequoia groves would move toward the desired condition for the fire severity indicator and would be at reduced risk from catastrophic fire.

In conifer vegetation types, mechanical treatments and prescribed fire treatments would reduce ladder fuels and intermediate crown fuels. These changes would result in reduced stand densities, increased crown base heights, and reduced surface fuel loads, which in turn would reduce the risk of severe wildfires. In mixed brush vegetation types, fuels would be treated mechanically and prescribed burned to reduce fire susceptibility. Fewer acres would be treated in Alternatives 1, 2, and 5 than in Alternatives 6 or Modified 6. The long-term effect would be a reduction in the risk of catastrophic fire in wildland urban intermix zones and in the giant sequoia groves in Alternatives 6 and Modified 6.

Currently the Monument has 23 miles of viable fuelbreaks. Alternatives 1, 2, and 5 would continue to maintain the majority of these fuelbreaks with mechanical treatments and/or prescribed fire.

Over the long term, strategically placed area treatments, which are primarily in the wildland urban intermix areas, would reduce fuel loadings, ladder fuels, and some canopy, and therefore move the treated areas toward a more historic fire return interval (see Table IV-10).

c) Alternatives 3 and 4

Alternatives 3 and 4 would treat the most acres with prescribed fire and the least amount of acres with mechanical treatments (based on modeling estimates). The number of high and moderate wildfire susceptible acres treated in the first decade would be more than in Alternatives 1 and 2 and less than in Alternatives 5, 6, and Modified 6 (Table IV-7).

Under the defense zone strategy, both alternatives would create defensible space for firefighters. Alternative 3 would likely treat a wider zone around communities than Alternative 4. Overall, Alternatives 3 and 4 would provide less protection to communities than the other alternatives due to the increased risk of damage from prescribed fires or wildfires near the community defense zones (see the discussion on Spot Fire Potential). A wildfire's extent and magnitude would not be reduced as well before reaching the defense zone under Alternatives 3 and 4 as it would under Alternatives 6 and Modified 6. In addition, the protection strategies in Alternatives 3

and 4 would not enhance firefighter suppression capabilities as well as the other alternatives.

Fire susceptibility would be reduced in the defense zones and, as treatments for restoration are completed, fire susceptibility would be reduced over the general Monument lands. However, the pace in the first decade of moving toward desired fuel conditions and a stand structure that supports a low-intensity surface fire would be slower than under Alternatives 5, 6, or Modified 6. In addition, there would be a greater likelihood of not treating heavy fuel loadings, ladder fuels, and dense canopied forest stands adjacent to defense zones, due to the risk of spot fires and escaped prescribed burns (outside of the defense zone only prescribed fire and limited hand treatments would be permitted).

The direct effects of prescribed burning and wildland fire use for restoration purposes outside the defense zones would be to reduce ladder fuels, surface fuels, and crown fuels in mixed conifer and pine stands. Torching of individual trees and parts of stands would occur in areas with high fuel loads. These alternatives emphasize the use of prescribed fire to move toward desired conditions and limit the areas where mechanical treatments can be applied. While this method would move the Monument toward desired conditions for stand heterogeneity, age, and species composition over the long term, the short-term effects on other resource values could be undesirable from higher intensity burns. The extensive use of prescribed burning and wildland fire use in areas of moderate or high fuel loading would not likely meet desired outcomes such as flame length and crown base height.

Treated areas would move toward a more frequent fire return interval. Desired conditions would be reached more slowly than in Alternatives 5, 6, and Modified 6 (see Table IV-10), and faster than in Alternatives 1 and 2 outside wildland urban intermix zones.

Under Alternative 3, approximately 145 miles of road would be decommissioned. This would affect suppression by limiting ground-vehicle access to wildland fires. Most of the roads proposed for decommissioning would be spur roads, which are not arterial or collector roads that take firefighters into general areas. However, some of these have provided access to wildland fires in the past. Some of these roads could also be used for fire lines or access to fuel treatment projects. Helicopters would be relied on more often to control fires. This could create the need to shift fire-fighting resources for some areas from engines to more expensive and seasonally scarce helicopters.

Under Alternative 4, approximately 25 miles of road would be decommissioned. This would affect suppression the same way as in Alternative 3, but to a lesser degree. This could create the need to shift fire-fighting resources for some areas from engines to helicopters.

There are currently 22 miles of viable fuelbreak outside of defense zones in Alternatives 3 and 4. Alternatives 3 and 4 would be limited to prescribed fire and hand treatments for maintenance of these fuelbreaks. Due to the increased risk to other resources with the use of prescribed fire alone, fuelbreaks that are in close proximity to but outside of community defense zones might be difficult to maintain.

d) Alternative 6

Alternative 6 is similar to Alternatives 1, 2, and 5 in that it would use wildland urban intermix defense and threat zones and strategically placed area treatments as part of its protection strategy. Alternative 6 would provide a greater degree of protection than the Alternatives 1, 2, 3, 4, and 5 due to increased flexibility in its standards and guidelines and the application of them to more acres of the Monument. Alternative 6 would provide all the necessary steps of protection similar to Modified Alternative 6.

Firefighter suppression capabilities would be enhanced the most in this alternative. It would allow the most flexibility in removal of specific stand components that can modify fire behavior. Mechanically reducing crown cover, raising crown base heights, and modifying tree spacing would create different patch dynamics and stand mosaics across the landscape than in Alternatives 1, 2, and 5. Fire susceptibility would be reduced on more acres (see Table IV-7) in the first decade than in any other alternative. The long-term effect would be a more discontinuous landscape of vegetation that would reduce the potential for catastrophic wildfire.

Alternative 6 is similar to Alternative 5 and different from Alternatives 1, 2, and Modified 6 in that restoration is addressed in the overall strategy to re-introduce fire. The same flexibility would be allowed in restoration treatments as in protection treatments, producing the same short-term and long-term effects.

Alternative 6 would return fire to the ecosystem on the most acres in the first decade and therefore move the most acres toward an historic fire return interval. Important effects on stand structure components would include an increased crown base height and the removal of ladder fuels, which would reduce the risks from wildfire to important wildlife elements such as large trees and canopy cover. Through a combination of mechanically-created gaps and the use of prescribed fire, this alternative would move closer to creating a mosaic of vegetation and a variety of fuel complexes by varying structure, age, and type.

In Alternative 6, existing fuelbreaks would be maintained with mechanical and/or prescribed fire treatments.

e) Modified Alternative 6

Modified Alternative 6 is similar to Alternatives 1, 2, 5, and 6 in that it would use wildland urban intermix defense and threat zones and SPLATs as part of its protection strategy. Modified Alternative 6 would provide a greater degree of

protection than all the other alternatives except Alternative 6 due to increased flexibility in its standards and guidelines and the application of them to more acres of the Monument except Alternative 6.

Firefighter suppression capabilities would be enhanced the second-most in this alternative. It would allow the second-most flexibility in removal of specific stand components that can modify fire behavior. Mechanically reducing crown cover, raising crown base heights, and modifying tree spacing would create different patch dynamics and stand mosaics across the landscape. Fire susceptibility would be reduced on more acres (see Table IV-7) in the first decade than in all alternatives except Alternative 6. The long-term effect would be a more discontinuous landscape of vegetation that would reduce the potential for catastrophic wildfire.

Modified Alternative 6 is similar to Alternatives 1 and 2 and different from Alternatives 5 and 6 in that restoration is not addressed in the overall strategy to re-introduce fire. In this alternative, restoration would be a secondary benefit as protection treatments are completed, producing the same short-term and long-term effects.

Modified Alternative 6 would return fire to the ecosystem on the second-most acres in the first decade and therefore move the second-most acres toward an historic fire return interval. Important effects on stand structure components would include an increased crown base height and the removal of ladder fuels, which would reduce the risks from wildfire to important wildlife elements such as large trees and canopy cover. Through a combination of mechanically-created gaps and the use of prescribed fire, this alternative would move closer to creating a mosaic of vegetation and a variety of fuel complexes by varying structure, age, and type.

In Modified Alternative 6, existing fuelbreaks would be maintained with mechanical and/or prescribed fire treatments, with minor exceptions for specific wildlife habitat constraints.

4. Giant Sequoia and Mixed Conifer

a) Summary of Effects and Treatment Amounts

The following discussion is based upon the estimated cumulative acres of treatment by alternative for the first two decades and the first 50 years of implementation as displayed in Table IV-1 at the beginning of this chapter. All amounts in the first two decades are assumed to be initial entries, during implementation of the protection strategy and restoration of plantations. The initial treatments for the protection strategy would be completed in the first two decades. The amounts for the first 50 years include initial entries for restoration purposes (except for Alternatives 1 and 2) as well as maintenance treatments of previously treated areas.

Table IV-12 summarizes the number of acres of giant sequoia groves that would be within in defense zones. The reduction in canopy cover in the defense zones due to protection treatments would encourage the establishment of giant sequoias and other shade-intolerant species such as pines and black oak in these areas. In this way, implementation of the protection strategy would also help to implement the restoration strategy.

Over the first two decades, the alternatives would vary by the amounts of treatments (as approximated by computer modeling), so the ecological effects would occur at different rates. Fire would be re-introduced to approximately one-third to one-half of the Monument as areas are treated to protect communities and other resources. Alternatives 5, 6, and Modified 6 would treat an estimated 2,000 more acres per year than Alternatives 2, 3, and 4 in the first two decades, so they would treat about 60,000 more acres, primarily by implementing their restoration strategies. Therefore, the ecological effects in the first two decades would be the least for Alternatives 1 and 2, followed by Alternatives 3, 4, and 5, then followed by Modified Alternative 6. Ecological effects would be the greatest in the first two decades for Alternative 6, as it would treat the most acres in this time period.

Table IV-12: Acres of Defense Zone in Giant Sequoia Groves (mixed conifer vegetation):

Alternative	Estimated Acres)
1	1,750
2	1,750
3	300
4	300
5	1,750
6	1,750
Mod 6	1,750

b) All Alternatives

(1) Effects of Treatments

- Prescribed burning (including wildland fire use) in mixed conifer stands, followed by "maintenance" underburning: Direct effects of prescribed burning would include: reduced fuel loading, reduced density of vegetation, and reduced canopies of overstory trees, depending on fire behavior. Openings of various sizes would be created in the canopy. Indirect effects would include reduced risk of catastrophic fire, new patches of vegetation, and improved health and vigor in residual trees (due to reduced competition for light, soil, moisture, and nutrients). There is an element of uncertainty as to the scope and amount of these effects because of the difficulty in predicting fire behavior and variations in fuel loading and burning conditions. The degree of uncertainty varies

by alternative. For example, Alternatives 3 and 4 would greatly limit the opportunity to use mechanical methods. Alternative 6 emphasizes the use of mechanical methods in conjunction with prescribed fire. Repeated underburning at regular intervals has benefits in that it helps to minimize the buildup of fuels on the forest floor as well as the accumulation of heavy understory vegetation that can serve to carry ground fires up into the canopy of trees. In addition, frequent fire return intervals allow for periodic pulses of nutrients to be returned to the soil profile and help to create conditions for the establishment of young trees. This is done by exposing barren mineral soil and openings in the overstory canopy that allow seedlings to become established. Larger canopy openings create conditions that favor the establishment of shade-intolerant species such as pines and giant sequoia, which do not survive and grow well under shade. Conditions for shade-intolerant species are generally more favorable in openings that are larger than ¼ acre as there is greater opportunity for these species to grow under more open conditions. These patches of young trees would be exposed to varying degrees of prescribed fire on a return interval ranging from 20 to 40 years. The intent of the return of prescribed fire is to expose landscapes to fire rather than to burn every acre at every return interval. Prescribed fires will burn different areas at different intensities and the fires will miss some areas because of the variability in burning conditions and fire behavior. This variability would result in some patches of young vegetation avoiding any damage completely or experiencing minimal damage from each return of fire. This in turn will allow these patches of vegetation to contribute to long-term population sustainability.

- Prescribed burning and/or mechanical shredding or chipping in chaparral and brush stands: Direct effects would include the creation of burned areas and gaps in the brush stands. Indirect effects would include the establishment of young seral stages of vegetation, an increase in the heterogeneity of the stand (including more variety in sizes, ages, and distribution of vegetation), and a reduced risk of catastrophic fire behavior. A key cumulative effect would be the likely reduced damage to vegetation that is in proximity to, and generally upslope of, the treated areas. This is due to the modification of wildfire behavior.

- Mechanical treatments to create gaps and thin conifer stands, followed by prescribed fire: Direct effects would include the creation of openings in the forest canopy, a modification of fuel characteristics, and reduction in the density of trees in the thinned areas. Indirect effects would include a reduced risk of catastrophic fire, improved growing conditions as new vegetation becomes established, and improved growth rates in residual trees. Conifer

stands would be healthier and be more resilient to drought and insect attacks. Cumulative effects would include less vegetation lost to catastrophic wildfire and the development of stand structures more consistent with desired conditions, especially the continued development of a mosaic of vegetation age and size classes. Creating openings in the forest canopy (gaps) through the use of mechanized equipment (heavy machinery and/or chainsaws) would provide more precision in producing the desired stand structure changes.

- Repeated or maintenance prescribed burns: The alternatives propose to continue to use prescribed fire as the primary method to maintain desired conditions. Direct effects would include the continued creation of small gaps and holes in the forest canopy, reduced fuel loading, and controlling the density of trees and other vegetation. Indirect effects would include the continued introduction of new patches of vegetation, reduced risk of stand-replacing wildfires, and reduced tree mortality from wildfires. Cumulative effects would include continued development of a mosaic of vegetation age classes, an increase in the number of large trees, and an increase in the amount of late seral stage old forest.

(2) Direct Effects

- Treatments using prescribed fire alone or in conjunction with hand cutting and mechanical methods would create gaps, especially in areas where fuel loading is very concentrated. In those areas, fire behavior would exhibit much localized torching and “hot spots” that would burn holes in the forest canopy. These gaps would range in size from less than 1/10th acre to several acres in size. In areas where there is no hand cutting of trees or mechanical pre-treatment or thinning, there would be a greater likelihood that gaps would be created larger than the desired sizes. In areas where gaps are created by hand cutting and mechanical methods, the amount of area in gaps would be more likely to meet desired conditions, as results achieved through mechanical methods are more predictable and there is a higher degree of control.
- In areas where fire intensity or soil disturbance is high, barren soil would be exposed, which would provide conditions for the establishment of young conifers and other vegetation (brush, forbs, etc).
- Stand density would be reduced and most of this reduction would be in suppressed and intermediate trees smaller than 20 inches in diameter in the understory. These small trees are the “ladder” fuels that can help lead to intense canopy fires. Lesser amounts of codominant and dominant trees would be killed or removed by

prescribed fire and/or hand cutting and mechanical thinning. Some hardwoods would be killed along with the conifers. The degree of thinning with prescribed fire is less predictable than it is with mechanical methods. Monitoring data from the adjacent Sequoia National Park indicates a 61% reduction in tree density in the mixed conifer-giant sequoia forest after prescribed fire treatment (USDI, 2001). A similar effect would be expected under all action alternatives if mechanical treatments are used, as site conditions in the Monument are very similar to those in this national park.

- Fuel loading would be reduced. Monitoring data from the Sequoia and Kings Canyon National Parks indicate that post-burn fuel loading levels in mixed conifer forests is reduced by approximately 70 to 80%, depending on the species composition of the mixed conifer forest (USDI, 2001). Treatments would also lead to a reduced risk of catastrophic fire.
- **All alternatives would be effective in meeting the indicator for fire severity and moving toward the desired condition to reduce the risk of catastrophic fire. Giant sequoia groves in particular would move toward the desired condition for the fire susceptibility indicator, in which less than 25% of grove acres have a risk of high fire severity.
- In the mixed brush and oak stands, within the first two decades, a mosaic of age classes and young species would be created under all alternatives.
- Where mechanical treatments are clearly needed for protection or restoration treatments in giant sequoia groves, there would be a potential to damage the roots of giant sequoias, since many of their roots are found close to the surface. There are soil quality standards and guidelines that restrict the amount of surface area that can be disturbed by mechanical methods, and machinery would not be allowed under the drip line of large giant sequoias, where the greatest concentration of roots are likely to be found.

(3) Indirect Effects

- All alternatives would be responsive to the plant community indicator, both in the short term and in the long term. The creation of gaps would lead to the establishment of young mixed conifer vegetation that would include giant sequoias and pines. In openings close to seed-bearing giant sequoias, giant sequoia seedlings would become established, along with other naturally occurring species (Demetry and Duriscoe, 1996). Long-term survival and growth of shade-intolerant species would be more reliable in openings larger than ¼ acre, due to the more open conditions toward the middle of openings (away from the edge

effect of adjacent large trees). It is likely that initial prescribed burning treatments for protection or restoration purposes would lead to a change in composition in both the smaller diameter classes and larger diameter classes (Sequoia National Park, 2002; Kiefer et al, 2001). The relative density of giant sequoia tripled from 5 to 16% ten years after initial burning as seedlings became established in the understory. Specific estimates of sequoia establishment are not possible because sequoia seedlings typically become established very close (100 to 200 feet) to cone-bearing trees.

- After the initial treatments for protection, the continued use of prescribed fire would create gaps in the mixed conifer forest over the long term. This would allow more new patches of vegetation to be established, which would move the forest toward the desired condition of a mosaic of age classes and sizes. The more frequent fire return interval would promote the development of shade-intolerant species, as the gaps and thinned stands would provide better growing conditions for these species.
- The species composition would begin to shift over time as gaps are created and new vegetation is established. In gaps or holes created in the forest canopy, seedlings would become established in a mix similar to that of the surrounding seed-bearing trees.
- There would be an increase over time in large trees (over 30 inches in diameter) as prescribed burning and thinning begin to reduce stand densities and open up forest canopies. All of the alternatives would increase the number of large trees similarly from about 6 trees per acre to over 12 trees per acre in 100 years. The use of prescribed fire on frequent return intervals would help maintain lower stand densities, so surviving larger trees would grow at a more rapid rate than they do under the current higher stand densities.
- The density of shade-tolerant species such as white fir and incense cedar would be reduced. Conversely, the trend towards under-representation of shade-tolerant species in the mixed conifer vegetation would be stabilized and eventually reversed as more frequent fire continues to create gaps and patches of young vegetation.
- Potential natural vegetation would be more likely to continue to develop in vegetation types (see the Ecological Units section in Chapter III) as fire is returned at a more frequent return interval. The establishment of potential natural vegetation would be highly dependent upon fire interacting with other biological and physical site characteristics.

- Within the first two decades, approximately one-third of the Monument would have fire re-introduced as part of initial treatments under the protection or restoration strategies. Fire would burn at lower intensities. This would be more reflective of pre-1875 conditions and would be consistent with the desired condition.

A prescribed fire burning with generally low intensity and only occasional flare-ups.

- Patches of new vegetation would become established, and shade-intolerant species such as giant sequoias, pines and hardwoods would increase in amounts as prescribed fire or thinning create gaps in the canopy. There would be sprouting from the stumps of oaks (primarily black oak) leading to new age classes of hardwoods. Gaps that are generally larger than ¼ acre would be more likely to promote shade-intolerant species. In the short-term, openings would be re-vegetated with mixed conifer species from adjacent seed-bearing mature trees. Over the long-term, there would be greater amounts of shade-intolerant species in gaps that are at least ¼ acre in size due to the reduced competition from adjacent established vegetation. The re-introduction of prescribed fire would begin to shift the species composition in favor of shade-intolerant species as openings are created in the canopy of conifer forest types. This effect is confirmed by results from the Sequoia

National Park (USDI, 2001). Specifically, giant sequoia regeneration would be expected to increase.

A patch of young sequoias and other conifers established in a gap created by prescribed fire.

- With the proposed prescribed burning and thinning, the health and vigor of the remaining trees and brush would improve because of the increased availability of sun, nutrients, and water after the treatments. This would make vegetation more resilient to effects from other natural processes such as insect activity, drought, and root disease.
- There might be an increased risk of non-native plants becoming established in treated areas. However, proposed standards and guidelines would minimize this risk by evaluating and designing each project proposal to avoid this risk.
- Areas of concentrated use might be removed from within giant sequoia groves if, based on landscape analysis, they are creating unacceptable impacts to the objects of interest and these impacts cannot be mitigated. The location and amount of these changes is not known. There are an estimated 25 acres of developed recreation sites and areas under special use permits located in portions of several groves. If removed, these facilities would most likely be relocated in nearby mixed conifer forests. The primary short-term effect would be a reduction in soil compaction associated with permanently surfaced or heavily compacted areas. The long-term effects would be an improvement in the growing conditions and tree health of giant

sequoias and associated mixed conifer vegetation due to improved soil health conditions (increased soil aeration, nutrient cycling, water-holding capacity). In addition, in areas where compacted surfaces are removed, young vegetation could become established, helping the groves move toward the desired condition of a mosaic of age classes and tree sizes. Any campgrounds that are moved outside the perimeter of the groves would be relocated, most likely in adjacent mixed conifer forest. These areas would incur very localized negative impacts to stand structure, as vegetation would be permanently removed to allow for development of structures and access roads. There would be an increase in paved areas and compacted soils. There would be a reduction in overall vegetation as areas are committed to permanent structures. The total area impacted within the groves and within the mixed conifer forest is estimated at 20 acres.

(4) Cumulative Effects

- Treatments designed to reduce the risk of catastrophic fire to the objects of interest would substantially be completed in the first two decades. These protection treatments would usually be located in areas that are currently highly susceptible to catastrophic fire or in defense or threat zones around communities and other key resources values. After treatment, fire susceptibility would be reduced in these areas, thereby reducing the risk of damage from catastrophic fire. In addition. Monitoring data indicates that prescribed fire activities in low to mid-elevation mixed conifer/giant sequoia vegetation leads to a 60 to 80% reduction in total fuels, measured in tons per acre (USDI, 2001).
- The number of large trees would increase, leading to an increase in the quantity and quality of old forest habitat.
- The patches of new vegetation established by prescribed burning or mechanical thinning would increase the variety of age classes and tree sizes and promote an overall mosaic of vegetation both within stands and across the landscape.
- The structures of the giant sequoia groves would shift toward the desired conditions as patches of young vegetation establish which include giant sequoias. The density of trees in the 30 to 130-year-old age class would be reduced, further helping to meet desired conditions. The treatments would thin out many trees in the understory and occasionally some trees in the overstory canopy. A long-term effect of reduced tree density from fire (both from initial treatments and follow-up burning) would be the opportunity for larger trees to grow more rapidly than under more dense stand conditions. Based on monitoring of prescribed fire activities in the adjacent Sequoia National Park, Kiefer (USDI, 2001) states that the reduced tree density "…falls within the range that may have been present prior to Euro-American

settlement, based on forest structural targets developed with input from research, historic photos, and written accounts…"

- The number and/or vigor of young trees less than 30 years old would increase as existing patches are protected from fire and thinned out, and new patches are established in new gaps.
- In the short term (up to 50 years), hardwood density in conifer stands would increase due to the opening of stands with prescribed burning or thinning. In the very long term, however, hardwood density might be reduced back to current levels as the numbers of large trees increase and begin to shade out the hardwoods, which generally do not grow as tall as conifers.
- The capacity of giant sequoia trees to adapt to changing environmental conditions would increase as compared to existing conditions. This would be due to the restoration of conditions more reflective of pre-1875 such as a more frequent fire return interval, reduced fire intensities, new patches of vegetation, and improved tree health and vigor after treatments.

c) Alternatives 1, 2, 5, 6, and Modified 6

The recruitment of young giant sequoias and other species in the first decade would begin to occur on approximately 14,000 acres of giant sequoia groves in the first two decades under Alternatives 1, 2, 5, 6, and Modified 6. Treating these acres would be part of the protection strategy (defense zones around communities and strategically placed fuel treatment areas to reduce the risk of catastrophic fire). In the short term, groves in Management Area GSG1 (Alternatives 5, 6, and Modified 6) would have relatively more gaps and patches of new vegetation than other groves because the management direction emphasizes practices to restore forest structure, including a mosaic of age classes and tree sizes. Activities in groves in Management Areas GSG2 and GSG3 would focus on reducing the risk of catastrophic fire in the short term. However, as these groves move toward desired conditions for reduced susceptibility of catastrophic fire, the emphasis would shift to creating new gaps in these stands as well.

Over the long term, groves in all management areas would move toward the desired condition as gaps are created, new patches of vegetation are established in these gaps, and the groves are at a reduced risk of catastrophic fire. Alternatives 6 and Modified Alternative 6 would have the most rapid implementation in the first two decades, followed by Alternatives 3, 4, and 5, and then Alternatives 1 and 2. This pace would allow ecological effects to occur at different rates. After 50 years, this difference would disappear under Alternatives 3, 4, 5, 6, and Modified 6, because all areas of the Monument will have been considered for either protection or restoration treatments. It is anticipated that a fire return interval of approximately 20 to 40 years would be established, which is substantially closer to the conditions pre-1875.

The protection strategies for Alternatives 1 and 2 would address immediate treatment needs but, although the Framework acknowledges that fire is an important component of ecological restoration, there is no specific proposed strategy to re-introduce fire on a long-term and sustainable basis. Some restoration (moving toward desired conditions of a mosaic of age classes and sizes, a diversity of species, etc.) would occur in areas where protection treatments occur, but long-term effects outside of these protection areas are unknown. Alternatives 1 and 2 would have a slower implementation of the protection strategy, so fire restoration benefits associated with the protection treatments would be less than under the other alternatives. This effect would be less for Alternatives 1, 2, and 5 (outside of the groves) than other alternatives because of the lack of a specific restoration strategy.

In Alternatives 5 and 6, gap sizes would be created that are more likely to be within the RMV as described in the affected environment (Chapter III) and desired condition (Chapter I). This is because the standards and guidelines and emphasis on the use of mechanical methods would provide more careful control of fuel arrangements on slopes generally less than 35% in giant sequoia groves (in Alternative 5), thereby making created gaps more likely to fall within the desired sizes (typically less than one acre in size). Alternative 6 emphasizes mechanical treatments throughout the Monument (as compared to only within the groves in Alternative 5) and so this effect would be greater for Alternative 6. Restoration treatments would not be emphasized except to restore fire first to those areas where the fire return interval departure (see Fuels section of this chapter) is the greatest.

The estimated amount of gaps likely to be created would vary by alternative. Under Alternative 5, an estimated 60 acres would be created within groves in the first decade. Under Alternative 6, an estimated 170 acres would be created in groves. This is possible because the management direction and standards and guidelines directly address the use and amount of mechanical treatments in groves. The outcomes of mechanical treatments are more predictable than the outcomes of prescribed fire alone. The amount of gaps is not estimated for other alternatives because there is no information available to estimate those created through the use of prescribed fire at landscape levels. This outcome would be a key focus of monitoring and adaptive management.

The amount of new patches of vegetation established during the first two decades would differ by alternative. Under Alternative 5, about 120,000 acres would be treated and patches would be established in gaps created by treatments. Under Alternatives 1 and 2, slightly fewer acres (about 105,000) would be treated and slightly less vegetation would be established. Alternatives 6 and Modified 6 would treat the most acreage in the first two decades and so would create the most new patches of vegetation.

The fire return interval indicator would be fully met by Alternatives 6 and Modified 6 because of the strategy to conduct protection and/or restoration treatments on all

fire-dependent vegetative ecosystems. It is anticipated that a return interval of 20 to 40 years would be established, which is substantially closer to conditions pre-1875. Over the long term, the treated areas would continue to receive treatments to move stand conditions and processes toward desired conditions.

Under Alternatives 1, 2, and 5 (outside of the giant sequoia groves), the defense zones, threat zones, and strategically placed fuel treatment areas (SPLATs) would have fire returned to their ecosystems. The potential effect of these alternatives on restoring a more frequent fire return interval to areas outside of these areas is unknown since there is no specific strategy proposed to do so.

Under Modified Alternative 6, during the first two decades, ecological restoration efforts would be focused on treating approximately 18,000 acres of plantations that were established after timber harvesting or wildfire events during the last 30 years. This emphasis is unique to Modified Alternative 6. Stand densities would be reduced from 300 or more trees per acre to 100 to 150 trees per acre on average. Risk from catastrophic fire would be reduced as brush and trees are removed. This reduction in risk would be sustained over time as maintenance underburns are conducted on a regular basis. The plantations would begin to move toward desired conditions as the heavy concentration of planted pine trees shifts to more of a mixed conifer stand. This would be due to the gradual introduction of other tree species in openings and disturbed areas in the plantations. Current openings in giant sequoia groves in which young giant sequoia trees have become established would continue to move toward desired conditions as treatments reduce the risk of catastrophic fires and young sequoias and other shade-intolerant species are protected during treatments. This would allow for a mosaic of young vegetation. In addition, stand densities and fuel loadings would be reduced in adjacent older trees, which would encourage long-term development of a mosaic of age classes, tree sizes, and species.

Under Alternatives 1, 2, 5, 6, and Modified 6, the existing road system would continue to provide good access for protection and restoration projects, both initial treatments in the short term and maintenance treatments over the long term.

d) Alternatives 3 and 4

Alternatives 3 and 4 would have very similar effects. They are the least likely alternatives to create gap and patch sizes through initial treatments that are within the RMV range. This is because, with the exception of very narrow (200’ or slightly larger, based on local conditions) defense zones around communities, all treatment would be done primarily by prescribed fire. These predicted effects are based upon field observation of prescribed fire projects within the Monument, as well as observations of prescribed fire results in the Sequoia and Kings Canyon National Parks. This effect would be less likely within the defense zones (1% of the Monument), where manipulation of fuel conditions by mechanical methods is allowed.

Prescribed fire treatments in existing high fuel loadings in much of the Monument would lead to flare-ups and torching of the overstory canopy. In addition, Alternatives 3 and 4 would create fewer new openings during the first two decades as compared to Alternatives 6 and Modified 6 because they treat fewer acres. This trend would diminish during the first 50 years, as complete restoration strategies are implemented across the Monument. Alternatives 3 and 4 would treat more acres during the first two decades than Alternatives 1 and 2 and would establish more patches of new vegetation. Under Alternatives 3 and 4, about 120,000 acres would be treated and patches would be established in gaps created by treatments.

The fire return interval indicator would be fully met by Alternatives 3 and 4 because of the strategy to conduct protection and/or restoration treatments on all fire-dependent vegetative ecosystems. It is anticipated that a return interval of 20 to 40 years would be established, which is substantially closer to conditions pre-1875. Over the long term, the treated areas would continue to receive treatments to move stand conditions and processes toward desired conditions. Restoration treatments would not be emphasized except to restore fire first to those areas where the fire return interval departure (see Fuels section in this chapter) is the greatest.

It is not clear how responsive these alternatives would be to the fire severity indicator or when groves would move toward the desired condition. This is because there would be no focused protection strategy for groves outside of the Human Influence Zone (Management Area HIZ), nor would the restoration strategy focus on treatment of giant sequoia groves.

Under Alternative 3, based on the Roads Analysis Process (Appendix E), an estimated 150 miles of road might be decommissioned. Under Alternative 4, an estimated 25 miles of road might be decommissioned. The unavailability of these roads would have minimal short or long-term effects, as they would have been determined not to be of high value for access for protection and ecological restoration objectives. The scope and extent of these actions would not be known until landscape-level analyses are completed and roads are proposed for decommissioning based on site-specific information.

5. Range

a) All Alternatives

All alternatives, except Alternative 3, would apply Framework guidelines. Some Framework decisions have been implemented, such as limited operating seasons for the willow flycatcher, while other decisions, such as meeting age class and range of natural diversity in riparian vegetation, require additional evaluation and project level environmental analysis. Cumulatively, these changes would be expected to reduce grazing 20-30% from grazing levels prior to the Framework. These reductions in grazing might be offset to a small amount by additional feed made available through additional burning and fuels treatment. Most fuels

treatments would be focused around communities, where grazing is already minimized to avoid conflicts. No additional reductions would be anticipated due to the status of the Monument, except as noted under Alternative 3 or where project level analysis and decisions determine the need for further adjustment to meet resource objectives or protect the objects of interest.

b) Alternative 3

Alternative 3 would eliminate grazing in high profile sequoia groves. This would directly affect three grazing permits, to the extent that the permits would be eliminated or may not be economically viable. Two other permits would be affected to a lesser extent. Grazing use would be reduced by approximately 1,135 animals and 5,300 animal units per month (AUMs), or approximately 10% of the current grazing program within the Sequoia National Forest.

Loss of substantial forage resources would be difficult to replace. Many small ranches have been subdivided when grazing is no longer able to support the base ranch. Resultant subdivision reduces the ability of the local community to absorb reductions in federal grazing permits, as well as increased encroachment and disturbance to wildlife habitat in the foothill belt surrounding the national forest. The lower Westside hardwood belt is an area of concern identified in the Framework due to the increased impacts and development adjacent to national forests. It is likely that reductions in federal grazing permits would contribute to that off-forest impact over time.

The grazing program on the Sequoia National Forest has declined from approximately 68,000 AUMs in the early 1980s to approximately 55,000 AUMs currently. Loss of jobs and economic return is small compared to the overall economy of the counties but can be locally significant in small rural settings. Rate of loss of lower Westside hardwood ecotypes is documented in the Framework.

6. Rare Plants

a) All Alternatives

Under all alternatives, species at risk would be protected. The Forest Service is mandated to maintain the viability of such species. Effects on species listed under the protection of the Endangered Species Act, both adverse and beneficial, are regulated by the USDI Fish and Wildlife Service. Effects on these species would range from minimal to no effect. Most of the discussion of potential effects to plant species at risk in this document is directed toward effects on future habitat potential rather than direct effects on existing populations.

Threats and proposed actions under this planning effort would be similar to and within the range of activities proposed in the Framework FEIS. Background on risk

and uncertainty is provided in greater detail in Volume Three of the Framework FEIS.

Most terrestrial plant species at risk within the Monument are at risk due to limited distribution and low population levels rather than proposed management. Most of the terrestrial species occupy rock outcrops, cliffs, or unique habitats related to poor soils with little competing vegetation. Species adapted to rock outcrops include: *Carlquista (Raillardiopsis) muirii, Cryptantha incana, Delphinium inopinum, Dicentra nevadensis, Dudleya cymosa ssp. Costifolia, Erigeron aequifolius, Eriogonum breedlovei var. breedlovei, Eriogonum twisselmanii, Heterotheca monarchensis, Lewisia congdonii, Lewisia disepala, Oreonana purpurascens, Streptanthus fenestratus,* and *Viola pinetorum ssp. grisea*. Treatments designed to reduce fuels are unlikely to target these areas for fuels reduction.

Some species might be adversely affected by avoiding natural or managed disturbances that maintain openings within the forest, since they depend on natural gaps created by fire, disease, and other factors. These species include: *Brodiaea insignis, Calochortus westonii, Clarkia springvillensis,* and *Hulsea brevifolia*.

Aquatic and riparian associated species include: *Botrychium crenulatum, Bruchia bolanderi, Hydrotheria venosa, Meesia ulignosa,* and *Meesia triquetra*. Effects on these species would vary little since all alternatives incorporate the riparian conservation strategy from the Framework. Grazing would still be allowed as discussed and subject to the guidelines in the Framework except under Alternative 3. Species found in riparian habitats are divided into meadow species and meadow edge/riparian/streambank species. Species in the meadow, bog, and fen habitats are unlikely to be affected by changes in management proposed in this plan. Provisions for protection of these species are provided in the Framework riparian conservation strategy that is carried through the Monument alternatives.

Habitat for riparian/meadow edge/streambank species might be limited under alternatives that constrain opportunities for gap creation within riparian conservation areas (streamside management zones). The Framework set guidelines to address areas where grazing may eliminate younger age classes within riparian forests.

Species that utilize small openings in forest, woodland, or shrub communities would have the greatest potential for effects from management proposed in the alternatives. For these species, lack of disturbance (exclusion of fire) might result in a dense canopy and or a heavy layer of duff that suppresses growth of herbaceous plants within these communities. Disturbance from natural or management intent might create openings that are too large and expose the plants to stress from wind and sun.

All alternatives would provide benefits of reduced potential for stand-replacing wildfires and the creation of small openings that support an herbaceous understory.

b) Alternatives 1, 2, and 5

Species that benefit from general openings would be likely to benefit under these alternatives. However, benefits might be offset by the priority for creating openings adjacent to communities, where increased disturbance may offset gains in potential habitat.

c) Alternatives 3 and 4

These alternatives would have the greatest effect on canopy reduction in the short term. The expectation of more intense prescribed burns in the absence of mechanical pre-treatment of fuels might benefit gap species such as *Clarkia springvillensis*, *Calochortus westonii*, *Monardella linoides*, and possibly *Oreonana purpurascens*, *hulsea brevifolia*, and *Raillardiopsis muirii*. Gaps would likely be a little larger than under other alternatives, but still fine-grained disturbances within the forest. The larger openings and greater reduction in canopy closure would be likely to favor the above; however, the benefit would be offset slightly by a greater chance of escaped fires, with larger openings and higher intensity.

Alternative 3 reduces or eliminates grazing in high profile groves. None of the identified species at risk are known to inhabit the areas around the high profile groves; however, unknown populations and/or potential habitat for *Botrychium crenulatum, Meesia uliginosa*, *M. triquetra*, *Hydrotheria venosa,* and *Bruchia bolanderi* might benefit from reduced trampling in meadows, fens, and stream banks.

d) Alternatives 5, 6, and Modified 6

The establishment of gaps in canopy closure and general openings would be more conservative than under Alternatives 3 and 4. Created openings and thinning would benefit gap phase species such as *Calochortus westonii* and *Clarkia springvillensis,* but not as much as the more intensive burning program. Both species appear to benefit from disturbance, including mechanical treatments, although under current guidelines occupied habitat of either species would not be treated mechanically intentionally. Based on observations by Forest Service staff, *Calochortus westonii* appears to colonize old skid roads and roadbeds. *Clarkia springvillensis* populates road cut banks and other areas of repeated low-level disturbance. Most of the gaps or openings would be limited to lower gradient slopes available for mechanical treatments and adjacent to communities where greater human disturbance may offset habitat improvement for species at risk. Use of mechanical treatment gives greater control to avoid known populations but increases the potential for compaction and displacement of soil in potential habitat.

7. Noxious Weeds

Although noxious weed practices identified in the Framework would be implemented under all alternatives to minimize, prevent, and detect new infestations, it is assumed that there would be greater risk of infestation with increased mechanical treatment. All other factors being equal, Alternatives 1, 2, 5, 6, and Modified 6 appear to have a higher potential for introduction and spread of noxious weeds because of their greater reliance on mechanical treatments. Alternatives 3 and 4 appear to have lower potential for introduction and spread of noxious weed populations because of greater reliance on prescribed fire. With appropriate control measures, all alternatives would be within acceptable levels of risk.

8. Watershed

a) All Alternatives

All alternatives would embrace the aquatic management strategy and the ecosystem management strategy of the Framework.

(1) Aquatic Management Strategy (AMS).

"The fundamental principle of the AMS is to retain, restore, and protect the processes and landforms that provide habitat for aquatic and riparian-dependent organisms, and produce and deliver high-quality waters for which the national forests were established (USDA Forest Service, 2001, Record of Decision, Appendix A, page A-5)." The AMS includes the designation of riparian conservation areas (RCAs) along streams and around water bodies and critical aquatic refuges (CARs). RCAs focus on preserving, enhancing, and restoring habitat for riparian and aquatic-dependent species, ensuring that water quality is maintained or restored, enhancing habitat conservation for species associated with the transition zone between upslope and riparian areas, and providing greater connectivity within watersheds.

The AMS has four components, three of which are applicable to the Monument. The following summary of the AMS is incorporated into this statement by reference. The fourth strategy is direction for the Lassen National Forest pertaining to anadromous fish.

1. AMS goals focus on "end points" which provide a broad framework for establishing desired future conditions for ecosystem analysis at other scales. These goals are consistent with existing mandates such as the National Forest Management Act, the Endangered Species Act, the Organic Act, the Clean Water Act, etc. These acts and mandates include direction on Best Management Practice implementation and monitoring for reduction of non-point source pollution, soil and water quality standards, plant and animal

diversity, special habitats, and other specific goals documented in the Framework.

2. CARs have been designated in small subwatersheds that contain known locations of threatened, endangered, or sensitive species; highly vulnerable populations of native plant or animal species; or localized populations of rare native aquatic or riparian-dependent plant or animal species. CARs provide habitat for native fish, amphibian, and aquatic invertebrate populations. Streams in meadows, lower elevation grasslands, and hardwood ecosystems have vegetation and channel bank conditions that approach historic potential (see the Framework for a discussion of historic potential).
3. There are two CARs in the Monument. The southeastern edge of the Little Kern River CAR on the Tule River Ranger District overlaps the Monument boundary. This area has been discussed as part of the Kern River Basin section in the Affected Environment. The other CAR is located in the Mill Flat Creek Drainage on the Hume Lake Ranger District. This area has been discussed in the Upper Kings River Basin section of the Affected Environment.
4. The designation of RCAs follows those guidelines provided in the Framework. Modeling of all treatments and effects follow the direction in the standards and guidelines for RCAs in Appendix A of the Framework Record of Decision (ROD). RCAs are land allocations that are managed to maintain or restore the structure and function of streams and wetlands. Widths are as follows:

Stream Type	Width of Conservation Area
Perennial Streams	300 feet on each side
Seasonally Flowing Streams	150 feet on each side
Meadows or Streams with Special Features	300 feet on each side
Other Topographic Depressions	Determined at the project level

The location and size of CARs and RCAs in the Monument would remain as defined in the Framework until such time that a landscape analysis provides additional information in keeping with the ecosystem analysis strategy direction.

There are six riparian conservation objectives (RCOs). All have associated standards and guidelines that are discussed in Appendix A of Framework ROD. The following apply to Monument lands.

A. RCO #1. Ensure that identified beneficial uses are adequately protected and state water quality goals are implemented.
    1. Roads, trails, etc. do not result in soil compaction of 5% in RCAs or 10% in CARs.

2. Avoid pesticide application within 500 feet of known sites for special amphibians.
3. Implementation and monitoring of BMPs.
4. Identify existing and potential sources of sediment and reduction in non-point source pollution.
5. Prohibit storage of fuels and toxics except at designated administrative sites.

B. RCO #2. Maintain or restore geomorphic and biological characteristics of special aquatic features to provide for aquatic dependent species.
   1. Identify roads and trails that disrupt natural surface and subsurface water flow paths.
   2. Where possible restore timing, flow, and water table in riparian areas.
   3. Prevent resource damage to stream banks from exceeding 20% of stream reach or lake.
   4. In stream reaches identified as essential habitat for Little Kern golden trout, limit stream bank disturbance from livestock to 10% of the occupied stream reach.
   5. Ensure culverts and stream crossings do not create migration barriers.
   6. Locate drafting sites to avoid adverse effects.
   7. Evaluate Range of Variability using Stream Condition Inventory attributes for activities that could affect streams.
   8. During Federal Energy Regulatory Commission re-licensing, evaluate modifications of the project's natural hydrograph and effects on all life stages of native aquatic species.
   9. Maintain riparian resources, channel integrity, and fish passage.

C. RCO #3. Ensure a renewable supply of large down logs, applicable in both streams and plantations.

D. RCO #4. Ensure that management activities, including fuels treatments, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic and riparian dependent species.
   1. Avoid direct lighting in riparian areas and minimize the spread of fire into riparian vegetation.
   2. Use screening devices for water drafting pumps, fire suppression exempt; use low velocity pumps.
   3. When possible locate fire suppression facilities (camps, etc.) outside of RCAs or CARs.
   4. Allow activities within RCAs and CARs when consistent with RCOs.
   5. Prior to implementing ground disturbing activities within suitable habitat for the California red-legged frog, the foothill yellow-legged frog, and the mountain yellow-legged frog, assess conditions using Stream Condition Inventory protocols and develop mitigation measures.
   6. Assess existing uses during landscape analysis and identify conditions that degrade water quality or habitat for aquatic and riparian species.

E. RCO #5. Preserve, restore, and enhance special aquatic features (meadows, springs, bogs, etc.) to provide the ecological conditions and processes for the species that use them.
   1. Ensure hydrologic function of meadows and riparian areas are at a minimum at Proper Functioning Condition for range management analysis.
   2. Prior to re-issuing grazing permits, assess the capability of livestock management facilities located in riparian conservation areas with RCOs.
   3. Changes in allowable use:

Allowable Use Standard

Early Seral Stage	30 % utilization
Late Seral Stage	40 % utilization

   4. Degraded meadows (e.g., >10% bare soil and active erosion) require total rest from grazing until they have recovered and moved to mid to late seral status.
   5. Grazing standards may be modified to assess the effects of grazing on willow flycatcher. Must be part of a study developed in cooperation with Pacific Southwest Experiment Station.
   6. Limit browsing to no more than 20% of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings.
   7. Remove livestock from any area of an allotment when browsing indicates a change in preference from herbaceous to woody riparian vegetation.

F. RCO #6. Identify and implement restoration for water quality, riparian and aquatic species. Recommend and establish priorities for watershed restoration.

(2) Ecosystem Analysis.

The ecosystem analysis strategy as stated in the Framework, “Establishes a consistent, landscape-wide approach and context for maintaining or restoring ecological conditions that provide the desired levels of resources, such as clean water, clean air, plant and animal community diversity, and species viability, consistent with regulatory requirements and ongoing policies (USDA Forest Service, Pacific Southwest Region, 2001, Appendix T, page T-1).”

The ecosystem analysis strategy provides opportunities to perform assessments that are tailored to local conditions, capabilities, and restoration needs. The information assembled during landscape analysis would provide the basis for the identification of opportunities at the project scale to move the landscape towards desired condition. Ecosystem analysis is a prerequisite for determining which processes and parts of the landscape would most affect fish and riparian habitat, and would be essential for defining watershed-specific boundaries for RCAs,

CARs, and riparian management objectives. Ecosystem analysis would form the basis for evaluating cumulative watershed effects, defining watershed restoration needs, goals, and objectives; implementing restoration strategies; and monitoring the effectiveness of watershed protection measures. Site-specific analysis would be done at the landscape level to address resource needs and potential effects of individual project alternatives on riparian health and soil and water resources.

(3) Direct Effects to Riparian Health and Soil and Water Resources.

The direct effects of alternatives are their potential to affect riparian health and soil and water quality. Intensity, timing, and extent of vegetation management; location, density, and connectivity of campgrounds, facilities, other recreation sites and roads; and grazing are all management activities that have the potential to affect riparian health, and soil and water quality. Riparian health and soil and water quality are very closely connected and independently have the potential to affect the flow and timing of water.

The road network, along with urbanization, would have the highest impacts on soil and water quality. Roads and urbanization act as compacted sites and affect the flow and timing of water. These effects are widespread throughout the Monument and cause a disturbance that effectively expands the natural stream drainage network over entire watersheds, in this case all of the watersheds that contain the Monument. Expansion of the drainage system occurs because the road system is designed to function like a stream and carries water along road drainage systems for delivery into streams. The degree of expansion can be affected by the miles of extended drainage network and the number of drainage structures that discharge directly to a stream course or drainage. The effects to water quality would be identical to those from other impervious or compacted areas discussed above.

Restoration of the natural fire regime also has the potential to affect Monument watersheds. Past management has effectively excluded fire from the ecosystem. This interruption of the natural fire return interval has resulted in interruptions of physical, chemical, and biological functions and process, and created conditions that favor high-severity wildfires. “High-severity wildfire has diverse effects on watersheds and the aquatic environment. Direct short-term effects can include loss of streamside and upland vegetation and alteration of soil characteristics…Indirect effects can include increased flooding, increased sediment erosion and deposition, increased stream temperature, decreased fish and macro-invertebrate abundance, and alteration of instream habitat (Appendix C, Advisory X).”

The effects of high-severity fire on watersheds, water quality, and the riparian ecosystem are adverse in both the short and long term and result in a landscape

susceptible to future high-severity fire. This is evidenced by the fire history documented on the Sequoia National Forest where many severe fires (Stormy Fire, Fay Fire, McNally Fire) occurred on the sites of former fires. "Fire has a critical role for creating and maintaining landscape characteristics, habitat and species diversity, and life history complexity (Appendix C, Advisory X)." Each of the alternatives is predicted to reduce the amount of stand-replacing wildfire as a result of the acres treated to move the fire susceptibility rating towards low. By reducing the fire susceptibility, there would be a reduced risk of stand-replacing wildfire. See Table IV-1 for a summary of the acres treated in the first decade by alternative. Alternative 6 would treat the most acres, followed by Modified Alternative 6, Alternative 5, Alternatives 3 and 4, and then Alternatives 1 and 2, which would reduce fire susceptibility on the fewest acres in the first decade. These trends would continue in the second decade. According to computer modeling, Modified Alternative 6 would be the most effective in reducing catastrophic wildfire and therefore severe watershed effects in the first two decades, followed by Alternatives 6, 1, and 2, then Alternatives 3, 4, and 5. Over the first 50 years, Modified Alternative 6 would continue to be the most effective in reducing stand-replacing wildfires. Table IV-13 displays the estimated number of acres lost over time to stand-replacing wildfire for each alternative.

Table IV-13: Predicted Acres Lost to Wildfire by Alternative (stand-replacing/lethal fires only)

Alternative	1st 2 Decades	1st 5 Decades
1	9,720	18,450
2	10,600	24,320
3	10,950	21,800
4	10,800	21,320
5	10,920	23,220
6	9,140	15,720
Mod 6	8,280	12,780

Wildfire in many areas of the Monument could not occur in a beneficial manner due to the current concentration of fuels. Proposed treatments were designed in response to the need to treat this accumulation of fuels and reduce the potential for wildfires. "The alternatives to wildfire, prescribed burning and mechanical treatments, have less severe direct and indirect effects to watersheds than does high-severity wildfire. The relatively low intensity of prescribed fires results in less post fire soil erosion and change to soil structure. Mechanical treatments have variable effects on soil erosion and alteration of soil conditions, depending upon the method used. These effects range from less than to greater than prescribed fire (Appendix C, Advisory X)." While it is known that ground disturbance has the potential to affect soil quality, it is expected that as long as Soil Quality Standards and Best Management Practices are properly implemented in all projects effects to soil and water would be mitigated.

The consequences of fuels and vegetation management would include compaction and decreased infiltration leading to overland flow and potential flooding. Translation of sediment to the drainage would have the potential to affect stream bank stability. Sedimentation and increased flow along with the decreased delivery time would have the potential to negatively affect water quality. The full extent of effects would be evident in the health of the riparian areas.

Riparian health is key to how a riparian area responds to stress. Healthy riparian areas are able to respond to increases in sediment and flood flows and maintain stability. Riparian ecotype health is dependent upon channel type. Specific indicators included vegetative bank protection, sediment deposition, cutting, percent stable material, bottom scour, and deposition. Stream bank stability and compaction/infiltration/runoff relationships are important to determine increases in flow and timing of water. Riparian health is covered in detail in the Hydrologic Zone of Influence for Surface Water flow, Sequoia National Forest (USDA Forest Service, Sequoia National Forest, 2001).

Soil quality and soil productivity are affected by the amount of organic material in and on the soil and the depth and extent of compaction within watersheds. Most compacted areas in the Monument are located in high use areas around urbanized sites, in close proximity to streams or meadows, or are connected to riparian areas via drainage structures. Management of vegetation has the potential to affect soil quality through compaction and reduction of organic material. Reduction in organic material and compaction negatively affect soil quality and soil productivity and can have negative affects on stream bank stability. Soil compaction and organic material affect the ability of soil to absorb water and affects infiltration rates. A soil's inability to absorb rainwater or snowmelt results in increased runoff and overland flow. Increases in runoff rate can affect the flooding potential of a watershed. Soil infiltration and compaction affect the timing of water. Water that is the result of overland flow resulting from disturbance to soil quality decreases the residence time of water in the watershed. Water quality is affected by the transport of soil to the stream system where it becomes sediment. Results of sedimentation in the stream system are increasing mid-channel deposition, filling of pools, widening of streams and deposition of fines on gravels. Indicators of potential erosion would be evident by the loss of ground cover, compaction, and erosion, as identified with soil transects.

Implementation of Soil Quality Standards and Best Management Practices (BMPs) would minimize the risk of sediment delivery to aquatic systems from management activities. Activities including road and trail construction and maintenance, recreation, prescribed burning, and fuels and vegetation management, in addition to other activities, should not result in detrimental soil compaction that exceeds Soil Quality Standards, as long as these standards and BMPs are properly and effectively implemented. Soil Quality Standards and BMPs are incorporated into the AMS and are documented in Appendix F of the

Framework. As long as soil compaction from past, present, or reasonably foreseeable future management activity does not exceed more than five percent of the threshold of concern in any watershed, it would be expected that effects to riparian dependent species, riparian habitat, and soil and water resources would be minimized.

Identification of existing and potential sources of sediment delivery to aquatic systems in the Forest Watershed Improvement Needs database and scheduling soil and watershed restoration along with prescribed vegetation management would implement the non-point source pollution strategy and reduce the potential for increased sedimentation to water quality. At the project level, site-specific BMPs would be developed for implementation of preventive and restoration measures such as modifying management activities, increasing ground cover, reducing the extent of compacted surfaces, or re-vegetating disturbed sites to reduce or eliminate sediment delivery. This would be considered necessary to meet the AMS.

BMPs have been effective in protecting beneficial uses as identified in the Tulare Lake Basin. These practices have been applied in projects that result in ground-disturbing activities having the same physical and biological circumstances as the proposed fuels and mechanical treatments for the Monument. Visual field surveys have indicated that these BMPs, where properly implemented, have adequately protected and minimized the impacts to acceptable levels. Past deficiencies in the implementation of BMPs has been the cause for erosion and water quality problems. BMPs would be specified in project level NEPA analysis and would be monitored to assure their effectiveness in maintaining soil and water resources as well as any identified beneficial uses.

The Forest Service BMPs would be tailor made to account for diverse combinations of physical and biological environmental circumstances associated with all of the proposed treatments once projects are identified and located on the ground. Effectiveness of the Forest Service BMPs has been demonstrated to protect the beneficial uses of the surface waters in the State of California. BMPs incorporate 75 years of erosion control and watershed protection experience and are based on sound scientific principles. The land treatment measures incorporated into Forest Service BMPs evolved through research and development measures, and have been monitored and modified over several decades with the expressed purpose of improving the measures and making them more effective. On-site evaluations of the control measures by state regulatory agencies found the practices were effective in protecting beneficial uses and certifiable for Forest Service application to protect water quality.

(4) Potential Indirect Effects to Riparian Health and Soil and Water Resources.

The potential for wildfire defines circumstances that have not yet occurred. The wildfire threat to the watershed is high. The potential for wildfires is measured using departure from a normal fire interval. Fire susceptibility provides the information on how likely an area is to burn and provides a measure of risk. When wildfires burn at high intensity and over large areas, water quality can be affected as a result of the changes to sedimentation rates, channel stability, and riparian area health. The removal of vegetation and decreased water holding capacity of soil, along with hydrophobic soils, would increase flow rates and decrease the residence time of the water in a watershed. The result of this could be reduced soil quality from erosion, flooding, and impacts to riparian vegetation, stream stability, and riparian habitat.

(5) Cumulative Watershed Effects.

Treatments proposed in the Monument have the potential to affect multiple watersheds, which support numerous beneficial uses. “The watershed is the natural management unit for evaluating the physical consequences of management decisions (Appendix C, Advisory X)”. Because the proposed treatments comprise a variety of scales, from basin-wide fuel treatments to the installation of recreational facilities that would have a local effect, the scale of the specific management activity under consideration would define the watershed scale of analysis.

The cumulative watershed effects (CWE) methodology quantifies the effects of past, present, and reasonably foreseeable future management activities. The threshold of concern (TOC) is defined as an indicator of the potential for management activities to impact water quality, watershed stability, or beneficial uses. The TOC is based on an individual subwatershed’s ability to resist change. When the TOC is exceeded, the potential to affect water quality, stream stability, riparian habitat, and beneficial uses increases. Thus, the TOC provides a quantification of the potential of a watershed’s tolerance for disturbance. Once this level is approached, a more rigorous, field-based analysis is required prior to management activity.

The CWE analysis is the primary element of determining the effects of management activity on subwatersheds. This takes place at the site-specific project level, as the location of the activity is specific to the affected subwatershed. The CWE model focuses on the impacts of ground-disturbing activity. It includes the quantification of fuel treatment methods including prescribed burning and wildfire.

The CWE methodology will be used as a basis for predicting the effects of all activities, including recreation, on watersheds. This will occur during site-specific

project analysis. The current CWE analysis considers sediment transport, which is the process of concern relative to ground-disturbing activities such as fuels management. Chemical water quality in association with recreation development has the potential for CWE. As long as water quality is considered in the development of recreation facilities and Best Management Practices are implemented and effective, the potential for CWE is low. Mitigation would focus on maintaining potential pollutants on-site and monitoring would evaluate the effectiveness of treatment. "Restoration of existing water quality impairment from recreation facilities would be considered in conjunction with management plans for expanded recreational use during project level analysis (Appendix C, Advisory X)."

Currently, urbanized areas have had the highest potential to affect water quality resources and beneficial uses as a result of the high density of compacted areas, including roads. These areas pose the greatest threat from wildfires, as there is the greatest potential for loss of life, property, and resources. Therefore, these areas are the highest priority for treatment. Urbanized sites in subwatersheds typically place those watersheds closest to or in exceedance of their TOC. "Management activities in the Monument would likely lead to further exceedance of TOC for subwatersheds currently over TOC. Of particular concern for fuels treatment are the urban interface zones, where subwatersheds currently at or near the TOC would be the focus of greater fuels management. Of concern for recreation is increased use and development of already developed areas, where watersheds are already at or near the TOC (Appendix C, Advisory X)." Watersheds over TOC as a result of the high density of compacted sites such as roads, recreation and facilities are included in Table IV-14.

Table IV-14: Proposed Treatment Acres in Subwatersheds Over TOC as a Result of Roads, Recreation, and Urbanization

Subwatershed	Proposed Treatment Acres					Water-Shed Acres
	Alt 1&2	Alts 3&4	Alt 5	Alt 6	Mod Alt 6	
Holby Creek (8C-A)	273	273	273	273	273	2,956
Trib to N. Rube Creek (18B-E)	0	26	0	0	514	1,159
Alder Creek (18C-D)	0	96	0	0	1	653
Pup Meadow Creek (18D-G)	0	0	0	0	362	895
Unnamed (18D-I)	0	0	0	0	37	630
Unnamed (2E-F)	0	0	17	0	58	812

Table IV-15 lists the subwatersheds where recreational developments are proposed. Recreational sites listed in this table are potential sites for development. They are located in recreational opportunity areas that are the most likely to be developed in the next 15 years. None of these subwatersheds are currently over TOC and the effects of any proposed development would be analyzed in site-specific project analysis.

Table IV-15: Subwatersheds Where Recreation Development is Proposed

Watershed	Subwatershed	Recreation Site	Acreage
Middle Kern	1803000105_8C	Dome Rock Picnicking Site	0.5
Middle Kern	1803000105_8B	Magician Trail Head	2
Middle Kern	1803000105_8C	Peppermint Meadows	75
Middle Kern	1803000105_8C	Upper Peppermint Campground	75
Middle Kern	1803000105_8C	Upper Peppermint Trail	8
Middle Kern	1803000105_8H	Long Meadow Group Camp	1
Middle Kern	1803000105_8I	Holey Meadow Group Camp	2
Upper Deer Creek	1803000502_8D	Deer Creek Trail	Unknown
Upper Deer Creek	1803000502_8D	Deer Creek Trail	9
Middle Fork Tule River	1803000601_4D	Camp Nelson Connecting Trail	4
Middle Fork Tule River	1803000601_4B	Wishon Campground	5
Middle Fork Tule River	1803000601_4B	Wishon Campground	5
Middle Fork Tule River	1803000601_4B	Wishon Group Camp	2
Kaweah	1803000707_3F	Stony Creek Campground	10
Kaweah	1803000707_3F	Stony Creek Group Camp	8
Kaweah	1803000707_3F	Stony Creek Picnicking Site	5
Kaweah	1803000707_3F	Stony Creek Trail	2
Lower South Fork Kings	1803001003_2D	Big Meadow Picnicking Site	0
Lower South Fork Kings	1803001003_2D	Big Meadows	10
Lower South Fork Kings	1803001003_2D	Buck Rock Campground	3
Lower South Fork Kings	1803001003_2B	Horse Coral	0
Lower South Fork Kings	1803001003_2B	Marvin Pass	?
Converse-Mill Flat	1803001005_1H	Hume Lake Campground	25
Converse-Mill Flat	1803001005_1H	Quail Flat Picnicking Site	1
Converse-Mill Flat	1803001005_1H	Tenmile Campground	3
Converse-Mill Flat	1803001005_1B,C, D, E, F, G	Kings River SMA	Unknown

The July 2002 McNally Fire affected some of the subwatersheds in the Monument. These subwatersheds are located in the Middle Kern Watershed (1803000105) and are shown in Table IV-16. A number of these same subwatersheds affected by past fires are a priority for fuels treatment, and stream bank and soil stabilization restoration. Restoration activity is already occurring in the area burned by the McNally Fire, both inside and outside of the Monument.

Table IV-16: Subwatersheds Affected by the McNally Fire

Subwatershed	Total Subwatershed Acres	Fire Severity	
		Moderate	High
Lower Peppermint (8C_D)	1,721	957	102
Dry Meadow (8G_G)	2,735	1370	452
Unnamed (8G_I)	781	574	24
Middle Fork Kern (8G_J)	207	161	2
Lower Dry Meadow (8G_K)	576	363	0
Unnamed (8G_L)	772	552	13
Lower Nobe Young (8H_G)	1,930	914	197
Middle South Creek (8I_L)	1,016	438	131
Unnamed (8I_M)	573	476	96
Lower South Creek (8I_N)	1,218	816	201

The Monument occupies a small percentage of its affected watersheds. CWE is a spatial and temporal analysis. Analysis of effects for site-specific projects will focus on the potential effects in those subwatersheds affected by specific treatments and include the intensity, timing, and extent of past management activities including vegetation management, campgrounds, facilities, and roads, all of which have the potential to affect riparian health, soil and water quality. The actual locations of future treatments are only speculated for this FEIS.

Detailed CWE analysis will be performed for site-specific projects. At that time, the effects of the specific proposed action will be analyzed at the subwatershed scale with local knowledge of project disturbances. This direction is commensurate with the direction in the Framework Record of Decision (Appendix A, page A-21). We are instructed to "Conduct project-specific cumulative watershed effects analysis following Regional procedures or other appropriate scientific methodology to meet NEPA requirements (Framework ROD, Appendix A, page A-53)."

The hierarchical framework of ecosystem analysis will facilitate cumulative effects analysis by providing information across multiple scales. Specific direction for ecosystem management is in Appendix A of the Framework ROD and Appendix T of the Framework FEIS. Table IV-17 below displays the relative percentage and acres of treatment proposed in each alternative by the fifth field hydrologic unit or watershed (as well as by seventh field hydrologic unit or subwatershed for those subwatersheds that are currently over TOC).

The values displayed in Table IV-17 indicate a similar extent of treatments watershed-wide for the first decade and for the total treatment percentages in all the watersheds affected by the Monument across the alternatives. Nine of the fifteen watersheds vary in percentage of treatment by alternatives by less than two percent. Those watersheds that do vary by treatment do so by less than eight percent of the treatment area by alternative. Treatment acres affect between 5.75% and 10.87% of the total watershed acres that contain the

Monument. Italicized numbers are used for those subwatersheds currently over threshold. If treatments are proposed in a subwatershed currently over TOC, the acres of proposed treatment and percentage it represents of that affected subwatershed are provided. These sites are of specific concern and will be evaluated at the landscape level where prescriptions will be tailor-suited to local conditions. A more detailed display of the percentage of treatment by type of treatment by watershed can be found in Table IV-18.

Table IV-17: Relative Percentage of Treatment Proposed by Watershed

Fifth Field HUC	Watershed	Alternative 1&2		Alternative 3&4		Alternative 5		Alternative 6		Modified Alternative 6	
Watershed #	Name (Acres)	Total % Trmt	Acres Total Trmt	Total % Trmt	Acres Total Trmt	Total % Trmt	Acres Total Trmt	Total % Trmt	Acres Total Trmt	Total % Trmt	Acres Total Trmt
1803000104	Little Kern River (84,717)	0.85%	720	0.88%	743	1.61%	1,364	0.58%	489	2.22%	1,878
1803000105	Middle Kern River (119,545)	7.68%	9,181	10.36%	12,381	12.71%	15,194	20.89%	24,971	11.51%	13,763
8C_A	Holby Creek (2,956)	*9.24%*	*273*	*9.24%*	*273*	*9.24%*	*273*	*9.24%*	*273*	*9.24%*	*273*
8C_D	Lower Peppermint (1,721)	*22.25%*	*383*	*22.25%*	*383*	*22.25%*	*383*	*22.25%*	*383*	*22.25%*	*383*
8G_G	Middle Dry Meadow (2,735)	*9.21%*	*252*	*9.21%*	*252*	*9.21%*	*252*	*9.21%*	*252*	*9.21%*	*252*
8G_I	Unnamed (781)	*14.47%*	*113*	*14.47%*	*113*	*14.47%*	*113*	*14.47%*	*113*	*14.47%*	*113*
8G_J	Middle Fork Kern (207)	*8.70%*	*18*	*8.70%*	*18*	*8.70%*	*18*	*8.70%*	*18*	*8.70%*	*18*
8G_K	Lower Dry Meadow (576)	*6.60%*	*38*	*6.60%*	*38*	*6.60%*	*38*	*6.60%*	*38*	*6.60%*	*38*
8G_L	Unnamed (772)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*
8H_G	Lower Nobe Young (1,930)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*
8I_L	Middle South Creek (1,016)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*
8I_M	Unnamed (573)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*
8I_N	Lower South Creek (1,218)	*8.29%*	*101*	*8.29%*	*101*	*8.29%*	*101*	*8.29%*	*101*	*8.29%*	*101*
1803000106	Salmon Bull Run (130,347)	0.04%	52	0.02%	27	0.05%	65	0.0%	2	0.01%	14
1803000401	Upper Poso (50,703)	1.89%	958	3.56%	1,805	4.65%	2,358	3.04%	1,542	1.45%	735
1803000501	Upper White River (7,172)	11.89%	853	19.67%	1,411	19.15%	1,373	17.98%	1,290	0.55%	40
1803000502	Upper Deer Creek (30,375)	9.30%	2,825	15.23%	4,626	20.44%	6,209	15.92%	4,836	11.13%	3,381
18B_A	Trib to Rube Ck (901)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*3.11%*	*28*
18B_E	Trib to N. Rube Ck (1,159)	*0.0%*	*0*	*2.24%*	*26*	*0.0%*	*0*	*0.0%*	*0*	*44.35%*	*514*
18C_D	Alder Creek (653)	*0.0%*	*0*	*14.70%*	*96*	*0.0%*	*0*	*0.0%*	*0*	*0.15%*	*1*
18D_G	Pup Meadow Ck (895)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*40.45%*	*362*
18D_I	Unnamed (630)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*5.08%*	*32*
1803000601	Middle Fork Tule (70,511)	9.76%	6,882	14.56%	10,267	17.22%	12,142	21.43%	15,110	13.36%	9,419

1803000602	North Fork Tule (34,997)	8.02%	2,807	12.90%	4,516	12.71%	4,448	19.08%	6,679	7.56%	2,646
1803000603	South Fork Tule (13,145)	10.31%	1,355	11.65%	1,532	16.12%	2,119	19.23%	2,527	12.41%	1,632
1803000704	Upper North Fork Kaweah (30,237)	7.72%	2,334	9.42%	2,850	11.89%	3,595	5.17%	1,564	13.97%	4,225
1803000705	South Fork Kaweah (5,724)	4.87%	279	7.00%	400	7.89%	452	7.20%	412	4.87%	279
1803000706	Upper Dry Creek (6,134)	12.32%	756	16.80%	1,031	16.61%	1,019	18.67%	1,145	17.75%	1,089
1803000801	Mill (13,306)	4.84%	644	10.06%	1,338	6.98%	929	9.23%	1,228	6.69%	890
1803001003	Lower South Fork Kings (58053)	6.41%	3,721	7.39%	4,288	11.04%	6,409	5.62%	3,264	16.47%	9,562
2E_F	Unnamed (812)	*0.0%*	*0*	*0.0%*	*0*	*2.34%*	*19*	*0.0%*	*0*	*7.14%*	*58*
1803001005	Mill Flat Creek (76,686)	11.39%	8,735	15.37%	11,786	16.07%	12,323	19.36%	14,843	18.61%	14,271
1B_H	Unnamed (526)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*19.77%*	*104*
1B_I	Sampson Creek (3,675)	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*0.0%*	*0*	*13.85%*	*509*
Total%	Affected Watersheds (731,652)	5.75%	42,102	7.45%	59,001	9.57%	69,999	10.87%	79,901	9.75%	63,824

Table IV-18: Relative Percentage of Treatments Proposed in Watersheds by Alternative

HUC 5	Grand Total	Alt ½					Alt 3/4				
Watershed	**Acres**	**Mech Burn**	**Rx Burn**	**Gap thin**	**Mech**	**Total % Trmt**	**Mech Burn**	**Rx Burn**	**Gap thin**	**Mech**	**Total % Trmt**
1803000104	84,717	0.07%	0.13%	0.00%	0.65%	0.85%	0.00%	0.88%	0.00%	0.00%	0.88%
1803000105	119,545.4	0.32%	3.62%	0.00%	3.73%	7.68%	0.35%	10.00%	0.00%	0.00%	10.36%
1803000106	130,347	0.00%	0.01%	0.00%	0.03%	0.04%	0.00%	0.02%	0.00%	0.00%	0.02%
1803000401	50,703	0.19%	0.89%	0.00%	0.80%	1.89%	0.95%	2.61%	0.00%	0.00%	3.56%
1803000501	7,172	0.35%	6.54%	0.00%	5.00%	11.89%	4.24%	15.43%	0.00%	0.00%	19.67%
1803000502	30,374.7	0.19%	5.77%	0.00%	3.33%	9.30%	1.22%	14.01%	0.00%	0.00%	15.23%
1803000601	70,511	0.62%	5.04%	0.00%	4.10%	9.76%	1.30%	13.26%	0.00%	0.00%	14.56%
1803000602	34,997	0.30%	4.76%	0.00%	2.96%	8.02%	1.96%	10.94%	0.00%	0.00%	12.90%
1803000603	13,145	0.54%	3.26%	0.00%	6.51%	10.31%	0.00%	11.65%	0.00%	0.00%	11.65%
1803000704	30,237	0.37%	2.38%	0.00%	4.97%	7.72%	0.92%	8.50%	0.00%	0.00%	9.42%
1803000705	5,724	0.10%	3.36%	0.00%	1.42%	4.87%	0.00%	7.00%	0.00%	0.00%	7.00%
1803000706	6,134	0.22%	5.47%	0.00%	6.63%	12.32%	1.81%	14.99%	0.00%	0.00%	16.80%
1803000801	13,306	0.06%	1.66%	0.00%	3.11%	4.84%	3.52%	6.54%	0.00%	0.00%	10.06%
1803001003	58,053.1	0.50%	1.66%	0.00%	4.26%	6.41%	0.01%	7.37%	0.00%	0.00%	7.39%
1803001005	76,685.7	0.23%	6.22%	0.00%	4.93%	11.39%	0.56%	14.81%	0.00%	0.00%	15.37%
HUC 5	**Grand Total**	**Alt 5**					**Alt 6**				
Watershed	**Acres**	**Mech Burn**	**Rx Burn**	**Gap thin**	**Mech**	**Total % Trmt**	**Mech Burn**	**Rx Burn**	**Gap thin**	**Mech**	**Total % Trmt**
1803000104	84,717	0.94%	0.22%	0.00%	0.45%	1.61%	0.00%	0.13%	0.06%	0.38%	0.58%
1803000105	119,545.4	4.33%	5.74%	0.07%	2.57%	12.71%	0.00%	5.87%	0.39%	14.62%	20.89%
1803000106	130,347	0.01%	0.02%	0.00%	0.02%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%

1803000401	50,703	2.62%	1.48%	0.00%	0.55%	4.65%	0.00%	1.78%	0.11%	1.15%	3.04%
1803000501	7,172	4.86%	10.87%	0.00%	3.42%	19.15%	0.00%	11.21%	0.61%	6.16%	17.98%
1803000502	30,374.7	8.59%	9.55%	0.01%	2.30%	20.44%	0.00%	12.79%	0.44%	2.69%	15.92%
1803000601	70,511	6.52%	7.97%	0.23%	2.51%	17.22%	0.00%	15.00%	0.27%	6.16%	21.43%
1803000602	34,997	3.09%	7.64%	0.12%	1.85%	12.71%	0.00%	11.92%	0.24%	6.93%	19.08%
1803000603	13,145	6.96%	4.95%	0.20%	4.02%	16.12%	0.00%	13.63%	0.21%	5.39%	19.23%
1803000704	30,237	4.85%	3.81%	0.08%	3.15%	11.89%	0.00%	3.56%	0.46%	1.15%	5.17%
1803000705	5,724	1.36%	5.56%	0.00%	0.98%	7.89%	0.00%	5.40%	0.26%	1.54%	7.20%
1803000706	6,134	3.00%	9.06%	0.00%	4.55%	16.61%	0.00%	8.36%	0.69%	9.62%	18.67%
1803000801	13,306	0.83%	4.20%	0.06%	1.89%	6.98%	0.00%	5.14%	0.24%	3.85%	9.23%
1803001003	58,053.1	5.83%	2.47%	0.16%	2.57%	11.04%	0.00%	4.53%	0.32%	0.77%	5.62%
1803001005	766,85.7	3.14%	9.71%	0.18%	3.04%	16.07%	0.00%	13.53%	0.44%	5.39%	19.36%

HUC 5	Grand Total	Modified Alternative 6					
Watershed	**Acres**	**Hand**	**MBSR**	**MECH**	**Pile**	**UNDB**	**Total % Trmt**
1803000104	84,717	0.08%	0.03%	1.37%	0.64%	0.10%	2.22%
1803000105	119,545.4	1.63%	0.63%	7.24%	1.28%	0.73%	11.51%
1803000106	130,347	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%
1803000401	50,703	0.49%	0.01%	0.27%	0.19%	0.49%	1.45%
1803000501	7,172	0.00%	0.53%	0.00%	0.00%	0.03%	0.55%
1803000502	303,74.7	3.01%	0.29%	3.21%	2.27%	2.35%	11.13%
1803000601	70,511	2.63%	2.20%	2.52%	1.67%	4.34%	13.36%
1803000602	34,997	1.78%	1.68%	1.70%	0.00%	2.40%	7.56%
1803000603	13,145	3.62%	0.56%	3.60%	2.38%	2.25%	12.41%
1803000704	30,237	2.73%	0.18%	9.15%	1.44%	0.49%	13.97%
1803000705	5,724	0.64%	1.74%	0.76%	0.00%	1.73%	4.87%
1803000706	6,134	2.79%	0.21%	6.58%	7.60%	0.57%	17.75%
1803000801	13,306	1.52%	0.00%	4.04%	1.06%	0.07%	6.69%
1803001003	58,053.1	2.81%	0.42%	7.14%	3.08%	3.02%	16.47%
1803001005	76685.7	3.15%	1.39%	8.83%	3.95%	1.30%	18.61%

Based on the percentages of the watershed-wide analysis, Alternatives 1 and 2 would have the lowest potential to affect water quality, with a percentage of watershed acreage affected of 5.75%. Alternatives 3 and 4 would have more potential with 7.45% of the watershed acreage affected. Alternatives 5 and Modified 6 would be next with 9.57% and 9.75%, respectively, and the alternative with the highest potential to affect water quality would be Alternative 6, with 10.87%. However, this analysis considers only the percentage of potential disturbance regardless of treatment type or wildfire threat. Any additional proposed projects, such as roads and recreation opportunities, will be considered along with past and reasonably foreseeable future effects at the time of site-specific project analysis.

The proportion of acres treated by mechanical, ground-based equipment (e.g., thinning, piling, crushing) and non-ground-based treatments (e.g., prescribed

fire, hand cutting) for each alternative, as estimated from modeling, are as follows:

- Alternative 1: 50% ground and 50% non-ground
- Alternative 2: 47% ground and 53% non-ground
- Alternative 3: 10% ground and 90% non-ground
- Alternative 4: 6% ground and 94% non-ground
- Alternative 5: 54% ground and 46% non-ground
- Alternative 6: 44% ground and 56% non-ground
- Modified Alternative 6: 63% ground and 37% non-ground

In analyzing effects, we consider the principle that the more acres are treated by mechanical methods, the higher the risk of cumulative watershed effects. However, this principle ignores many factors that are related to negative watershed effects. Three factors are key to the examination of cumulative effects: the nearness of the impact to the watercourse (McGurk and Fong, 1995), the amount and size of material removed (Erman and Erman, 2000), and the presence of roads (Furniss, et al, 1991). Using these criteria, all alternatives except Alternative 3 and 4 would probably have similar consequences. Alternatives 3 and 4 would have higher consequences since they would exert less control over the size and amount of material removed and the intensity of the fires during initial treatments. However, as discussed above, the effects of mechanical treatment need to be weighed against the risk of catastrophic wildfire.

Table IV-19 displays the estimated road miles by fifth field watershed. Alternatives 1, 2, 5, 6 and Modified 6 propose no changes to the designated road system. Alternatives 3 and 4 would include closing some of the existing road system to the public, maintaining some for administrative use, and decommissioning some. The closure of roads would help maintain drainage systems affected by use, especially during wet conditions. A decrease in the road system would reduce the potential for cumulative watershed effects by reducing the potential for sedimentation from compacted surfaces and by reducing the extended drainage network created through the road drainage system. A cumulative watershed effects analysis, along with road treatments, would be conducted at the landscape level and provide a more site-specific analysis for project-level management.

Table IV-19: Road Miles Proposed by Fifth Field Watershed

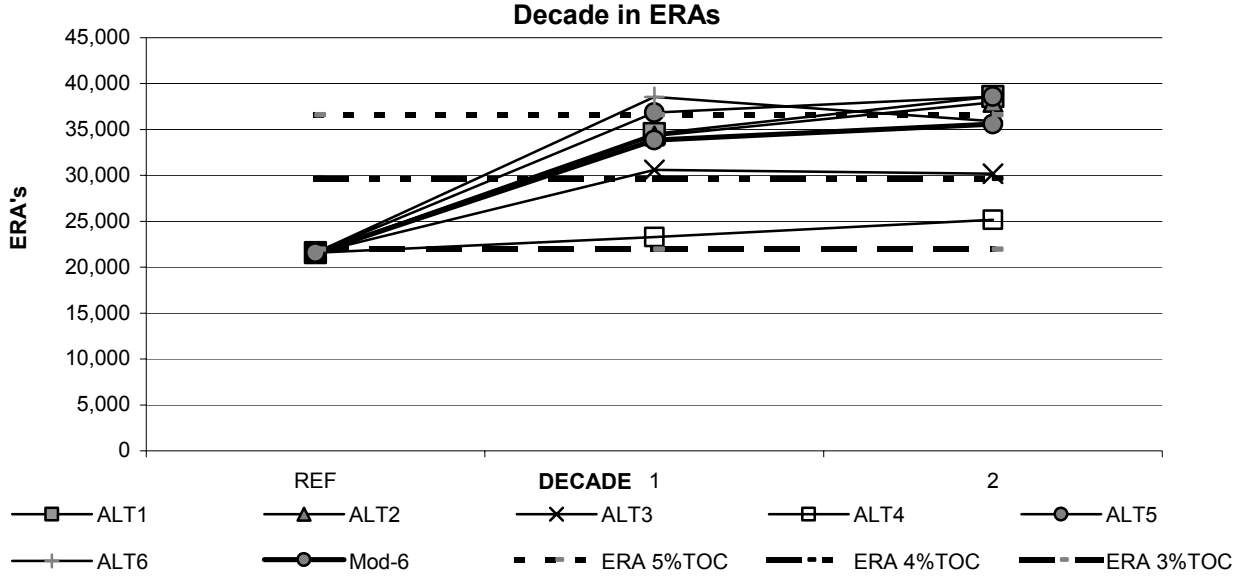
Fifth Field Watershed	Watershed Name	Total Road Miles	Alt 1,2,5,6	Alt 3 Retain	Alt 3 Retain/ Closed	Alt 3 Potential Decom	Alt 4 Retain	Alt 4 Potential Decom
1803000104	Little Kern River	17	23	14	6	3	22	1
1803000105	Middle Kern River	295	178	72	61	45	171	7
1803000106	Salmon Bull Run	417	0	0	0	0	0	0
1803000401	Upper Poso Creek	349	51	39	11	1	51	0
1803000501	Upper White River	69	20	17	2	2	20	0
1803000502	Upper Deer Creek	102	50	13	30	7	50	0
1803000601	Middle Fork Tule	167	57	32	15	10	57	1
1803000602	North Fork Tule	168	20	19	1	1	20	0
1803000603	South Fork Tule	156	45	34	11	0	45	0
1803000704	Upper North Fork Kaweah	188	122	83	24	15	120	2
1803000705	South Fork Kaweah	39	1	0	1	0	1	0
1803000706	Upper Dry Creek	105	24	15	3	6	24	0
1803000801	Mill	290	9	3	2	5	9	0
1803001003	Lower South Fork Kings	125	97	64	18	15	88	9
1803001005	Mill Flat Creek	307	202	111	56	35	196	7
Total		2,794	899	515	241	143	873	25

Comparison of the alternatives and range of TOC are provided in Figure IV-6. Estimated effects of the alternatives in equivalent roaded acres (ERAs) are shown for the first two decades. Decade 2 analyses are much less precise than those for Decade 1. Both decades are provided for comparison and trends that are expected based on current information. These values are only estimates, as site-specific conditions on the ground will determine the actual treatments and the timing of those treatments. It is expected that as long as additional analysis takes place at the landscape and site-specific project levels, individual threshold levels will be evaluated and CWE would not occur. Figure IV-6 shows that treatments proposed under all action alternatives would have similar effects on water quality and riparian resources when evaluated at the fifth field watershed and CWE would not be a concern at this programmatic level of planning.

There is a slight difference between alternatives and they appear to group into relatively high, moderate, and low levels of ERAs. All alternatives are at or below 5% TOC with the exception of Alternative 6, which is slightly above the 5% TOC level. Alternatives 5 and 6 would have the highest potential to affect water resources in the first decade; however, by the second decade, Alternative 6 would change position with the more moderate Alternatives 1 and 2. Alternative Modified 6 would maintain its intermediate position relative to CWE in both the first and second decades. Alternative 3 would have a lower potential for cumulative effects from a watershed perspective, while Alternative 4 would have

the lowest. Both Alternatives 3 and 4 remain in the same positions into the second decade. It must be emphasized that this analysis fails to consider the deviations from prescriptions that could occur in Alternatives 3 and 4 as a result of escaped fire or burning out of prescription.

Figure IV-6: Cumulative Watershed Effects of Alternatives for the First Decade in ERAs



(6) Clean Water Act.

Commensurate with the Sierra Nevada Forest Plan Amendment, all alternatives are expected to maintain and improve water quality and satisfy all state water quality requirements. This finding is based on the standards and guidelines, the application of state-approved BMPs specifically designed to protect water quality, and the discussion of water quality and beneficial uses. Examples include: (1) stream-type flexible width riparian areas, (2) critical aquatic refuges, (3) comprehensive landscape level analysis including existing uses, (4) Conservation Assessments of threatened and endangered species, and (5) incorporation of established recovery plans. Additionally, site-specific project analyses for activities subsequent to the decision will be required to demonstrate compliance with the Clean Water Act and state water quality standards.

(7) Flood Plains And Wetlands (Executive Orders 11988 and 11990).

These Executive Orders require Federal agencies to avoid, to the extent possible, short- and long-term effects resulting from the occupancy and modification of flood plains, and the modification or destruction of wetlands. Standards and guidelines are provided for soil, water, wetlands, and riparian areas to minimize effects to flood plains and wetlands. They incorporate the Best Management Practices of the Soil and Water Conservation Handbook. The

standards and guidelines apply to all floodplains and wetlands where less restrictive management might otherwise occur.

(8) Consistency with Framework Riparian Conservation Strategy.

Alternatives 1 and 2 are alternatives that closely follow those strategies outlined in the Framework and, based on those findings, would not have detrimental effects on riparian health and soil quality. It is therefore inferred that, since all of the alternatives evaluated in this statement propose similar levels of treatment in each watershed, they would all have similar levels of effects at the programmatic level. And, as expected in the Framework, analysis of site-specific treatments at the landscape level would be necessary to identify any potential impacts to soil and water resources at the project level. The level of treatment at the watershed level is displayed in the discussion of cumulative effects in this section.

9. Wildlife

a) Uncertainties

All of the alternatives address the key wildlife issue from Chapter I by increasing the area of late seral old growth (LSOG) habitat over time. LSOG would increase as a result of ecological restoration treatments and protection from wildfires. The methods (prescribed fire or mechanical) allowed for treating vegetation for ecological restoration and protection from unnaturally severe fires vary by alternative.

There is uncertainty regarding the effects of vegetation treatments with prescribed fire alone versus the effects of vegetation treatments with mechanical equipment in association with prescribed fire. Uncertain effects from prescribed fire include the potential risk of escaped fires leading to loss of wildlife and their habitats, as well as the reduced ability to protect habitat elements such as down logs and snags. Uncertain effects from mechanical treatments include negative impacts to wildlife habitat from the introduction of invasive plant species and the introduction of plant pathogens on cut stumps or damaged trees stems.

(1) Alternatives 1, 2, 5, 6, and Modified 6

These alternatives would allow the use of both prescribed fire and mechanical methods for vegetation treatments. Prescribed fire treatments in or adjacent to wildlife habitat would increase the risks of fires negatively impacting habitat elements such as down logs or snags or of reducing wildlife habitat as a result of prescribed fires that burn too hot or escape. These alternatives would allow the use of mechanical treatments on most acres in the Monument, outside of wilderness areas. Mechanical treatments can rearrange, remove, or reduce fuels prior to ignition, which reduces the intensity of the prescribed fire and the risk of

escape. Mechanical treatments can, in some circumstances, help protect habitat elements such as down logs and snags from subsequent prescribed fire, by rearranging or removing surrounding fuels. Over the last several decades, local use of prescribed fire, commonly in association with mechanical treatments, has resulted in a low risk of escape for prescribed fires and protection of these habitat elements.

None of the alternatives propose to allow or accept higher levels of risk from prescribed fire in order to meet restoration or protection goals. In areas where prescribed fire is considered too risky, prescribed fire treatments would not be implemented. Alternatives to prescribed fire would include the use of mechanical treatments, the use of hand treatments, or no treatment at all. The flexibility in these alternatives to use prescribed fire, mechanical treatment, or both would result in more opportunities to treat areas for ecological restoration or protection from severe wildfire than in alternatives that would limit the use of mechanical methods.

The use of mechanical methods in these alternatives might raise the potential for unintended introduction of invasive species or plant pathogens. Field surveys do not indicate an increase in invasive plant species or an increase in plant pathogens where mechanical treatments have been applied in the Monument over the last several decades.

(2) Alternatives 3 and 4

These alternatives would limit the use of mechanical methods for vegetation treatments and depend primarily on prescribed fire alone or hand treatments. Prescribed fire treatments in or adjacent to wildlife habitat would increase the risks of escaped fires negatively impacting habitat elements such as down logs or snags or of reducing wildlife habitat as a result of prescribed fires that burn too hot or escape. Alternatives 3 and 4 would allow the use of mechanical methods for vegetation treatment on about 8% of the acres in the Monument (primarily existing plantations and community protection areas). Over the last several decades, local use of prescribed fire, commonly in association with mechanical treatments, has resulted in a low risk of escape for prescribed fires and protection of these habitat elements. Except in defense zones (generally 200 feet wide) and plantations, mechanical treatments would not be allowed in Alternatives 3 and 4.

None of the alternatives propose to allow or accept higher levels of risk from prescribed fire in order to meet restoration or protection goals. In areas where prescribed fire is considered too risky, prescribed fire treatments would not be implemented. Alternatives to prescribed fire would include hand treatments or no treatment at all. The use of prescribed fire alone, without mechanical treatment, would result in fewer opportunities for ecological restoration or protection from severe wildfire in these alternatives than in those alternatives that would allow the use of mechanical methods.

The use of mechanical methods in these alternatives might raise the potential for the unintended introduction of invasive species or plant pathogens. The risk in these alternatives would be low due to the very limited areas where mechanical treatments would be allowed. In addition, field surveys do not indicate an increase in invasive plant species or increased pathogens where mechanical treatments have been applied over the last several decades in the Monument.

b) Habitats of Special Interest and Management Indicator Species

(1) Aquatic and Riparian

All Alternatives. Effects on aquatic habitats are addressed in the Watershed section. The potential effects on rainbow trout would be from increased sediment due to wildfire, fuel reduction or vegetation restoration treatments, road construction, trampling and loss of habitat from recreation, and increased water temperature from activities that create wide shallow areas or remove excessive vegetation and shade along streams.

The management direction in the Monument Plan, including the aquatic management strategy from the Framework, would provide adequate protection for aquatic and riparian habitat (see the Watershed section of this chapter for aquatic management strategy guidelines). Potential development of new recreation facilities, their associated roads, and increased recreation use would be unlikely to negatively impact aquatic and riparian habitat. This is due to the management direction provided to protect these habitats and the limited scope of potential development (less than 200 acres and less than ten miles of roads for recreation development). The actual effects of predicted increases in recreation use are unknown. Identification of impacts and resulting management actions would be based on monitoring results.

(2) Early Seral

All Alternatives. All alternatives would create early seral stage habitat resulting from vegetation treatments in defense zones, threat zones, and restoration treatment areas. Wildfire would also continue to create openings that would provide early seral stage habitat. In all alternatives, there would be an increase in early seral stage habitat over current levels over approximately the next 40 years.

Vegetation mosaics, created by treatments in the conifer and hardwood vegetation types, would include early seral stage habitat. Most inclusions of early stage habitat would be small (less than one acre) as a result of guidelines to maintain canopy closure, large trees, snags and other old-forest characteristics. In general, the prescriptions using mechanical treatments in

conifer stands would be unlikely to open canopies to the extent necessary for the development of shrub and herbaceous undergrowth.

Openings created by vegetation treatments in the chaparral and other brush types would be larger, since these treatments would be intended to mimic stand-replacing fires typical of historic events in these vegetation types. Openings in these treatments would be likely to develop shrub and herbaceous growth.

Openings resulting from wildfire could occur in any vegetation type, would be unpredictable, and could range in size from less than one acre to thousands of acres. Openings in these areas over one acre would be likely to develop shrub and herbaceous growth. Larger openings of 10 to 20 acres tend to benefit larger species such as deer, while smaller species such as quail appear to benefit from smaller openings. Very large openings (hundreds or thousands of acres) could interrupt the movement of some terrestrial species.

Potential development of new recreation facilities, their associated roads, and increased recreation use would be unlikely to negatively impact early seral habitat. This is due to the management direction provided to protect these habitats and the limited scope of potential development (less than 200 acres and less than ten miles of roads for recreation development). The actual effects of predicted increases in recreation use are unknown. Identification of impacts and resulting management actions would be based on monitoring results.

Alternatives 1 and 2. These alternatives would treat approximately 42,000 acres in the first decade with a combination of prescribed fire and mechanical treatments, resulting in increased early seral stage habitat. An additional estimated 20,000 to 25,000 acres would burn in wildfires.

Alternatives 3 and 4. These alternatives would treat approximately 59,000 acres in the first decade, primarily with prescribed fire, resulting in increased early seral stage habitat. An additional estimated 20,000 to 25,000 acres would burn in wildfires.

Alternative 5. This alternative would treat approximately 70,000 acres in the first decade with a combination of prescribed fire and mechanical treatments, resulting in increased early seral stage habitat. An additional estimated 20,000 to 25,000 acres would burn in wildfires.

Alternative 6. This alternative would treat approximately 79,000 acres in the first decade with a combination of prescribed fire and mechanical treatments, resulting in increased early seral stage habitat. An additional estimated 20,000 to 25,000 acres would burn in wildfires.

Modified Alternative 6. This alternative would treat approximately 64,000 acres in the first decade with a combination of prescribed fire and mechanical

treatments, resulting in increased early seral stage habitat. An additional estimated 20,000 to 25,000 acres would burn in wildfires.

(3) Late Seral

All Alternatives. Mature forest and large-tree-dominated habitats (California Wildlife Habitat Relationship habitat types 5M, 5D, and 6), late seral stage habitat, and the number of large snags, would increase under all alternatives.

Modeling indicators used are late seral old growth (LSOG) ranking, the number of large trees over 30 inches in diameter per acre, changes in spotted owl habitat, and the number of snags over 15 inches in diameter per acre. Another indicator for late seral stage species is the projection of acres likely to burn with fires of stand-replacing intensity.

Potential development of new recreation facilities, their associated roads, and increased recreation use would be unlikely to negatively impact late seral habitat. This is due to the management direction provided to protect these habitats and the limited scope of potential development (less than 200 acres and less than ten miles of roads for recreation development). The actual effects of predicted increases in recreation use are unknown. Identification of impacts and resulting management actions would be based on monitoring results.

Alternatives 1, 2, and 5. These alternatives would result in a gradual increase in late seral habitat. They would result in a modest decline of acres per decade lost due to stand-replacing wildfire. These alternatives would lead to a steady increase over time in spotted owl habitat, large trees per acre, and snags. Areas modeled as meeting LSOG ranks 4 and 5 would increase from nearly 70,000 acres to approximately 180,000 acres for Alternative 5, and would increase to over 190,000 acres for Alternatives 1 and 2 (when projected out 150 years). Large trees would increase from less than six per acre to more than seven per acre over the next 20 years. Spotted owl nesting habitat would increase from approximately 48,500 acres to about 66,000 acres over the next 20 years. The projected number of snags over 15 inches in diameter would increase from approximately three per acre to approximately five per acre over the next 20 years.

Alternatives 3 and 4. These alternatives would lead to a steady increase over time in spotted owl habitat, large trees per acre, and snags. Acres of LSOG ranks 4 and 5 would be projected to peak at just over 160,000 in 150 years. The higher loss of trees to fire in the short term would increase available nest trees for pileated woodpeckers and other cavity nesters. Large trees would increase from less than six per acre to more than seven per acre over the next 20 years. Spotted owl nesting habitat would increase from approximately 48,500 acres to about 68,000 acres over the next 20 years. The projected number of snags over

15 inches in diameter would increase from approximately three per acre to approximately five per acre over the next 20 years.

Alternative 6. Increased flexibility in fuels management would result in fewer acres lost to stand-replacing wildfire than under other alternatives, except Modified Alternative 6.. This alternative would lead to a steady increase over time in spotted owl habitat, large trees per acre, and snags. LSOG ranks 4 and 5 acres would be projected to increase to 198,000 in 150 years. Large trees would increase from less than six per acre to more than seven per acre over the next 20 years. Spotted owl nesting habitat would increase from approximately 48,500 acres to about 63,000 acres over the next 20 years. The projected number of snags over 15 inches in diameter would increase from approximately three per acre to approximately five per acre over the next 20 years.

Modified Alternative 6. Increased flexibility in fuels management would result in fewer acres lost to stand-replacing wildfire than under any other alternative. This alternative would lead to a steady increase over time in spotted owl habitat, large trees per acre, and snags. LSOG ranks 4 and 5 acres would be projected to increase to 198,000 in 150 years. Large trees would increase from less than six per acre to more than seven per acre over the next 20 years. Spotted owl nesting habitat would increase from approximately 48,500 acres to about 63,000 acres over the next 20 years. The projected number of snags over 15 inches in diameter would increase from approximately three per acre to approximately five per acre over the next 20 years.

Cumulative Effects. Long-term trends for late seral old growth forest and selected habitat elements are shown in the graphs below. Other recent effects considered include the loss of over 50,000 acres of mature forest habitat from the Sequoia National Forest and adjacent forests and parks in the last 15 years due to wildfire. Other projects that affect the distribution and quality of mature forest habitat include the Kings River Demonstration Project and fuels reduction projects on adjacent national forests and national parks.

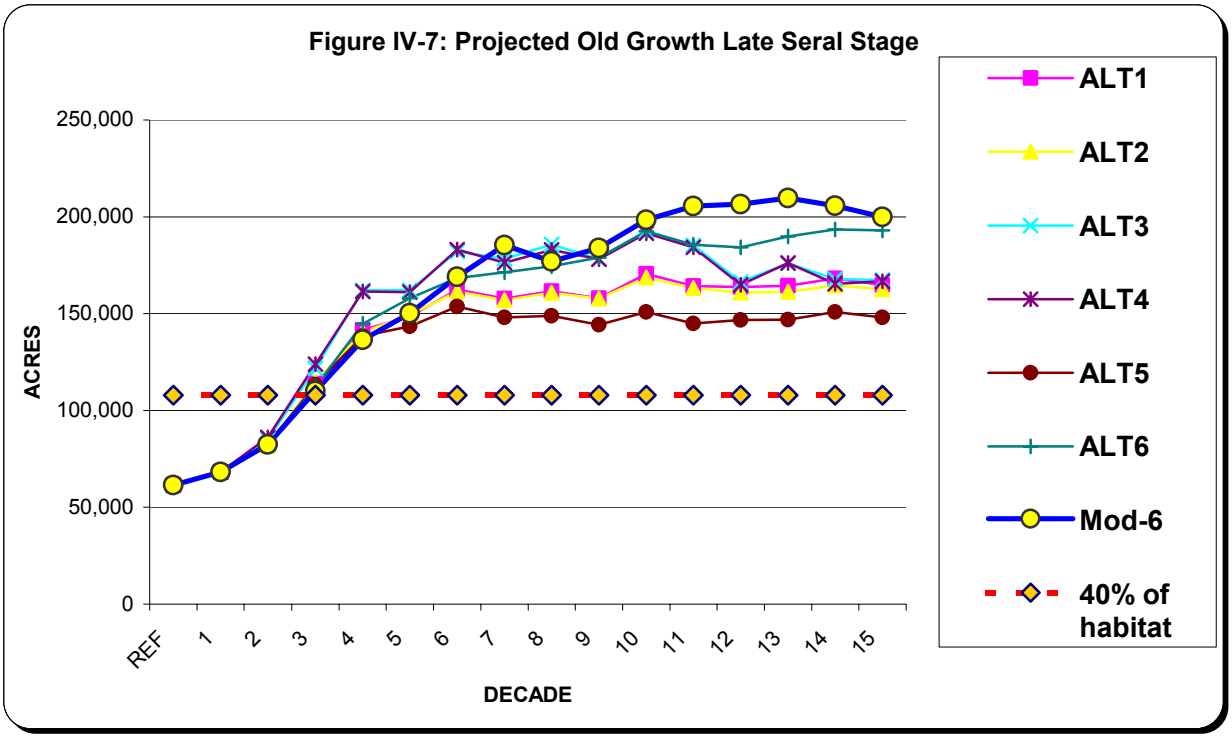


Figure IV-7: Projected Old Growth Late Seral Stage
ACRES
250,000
200,000
150,000
100,000
50,000
0
REF
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
DECADE
ALT1
ALT2
ALT3
ALT4
ALT5
ALT6
Mod-6
40% of habitat

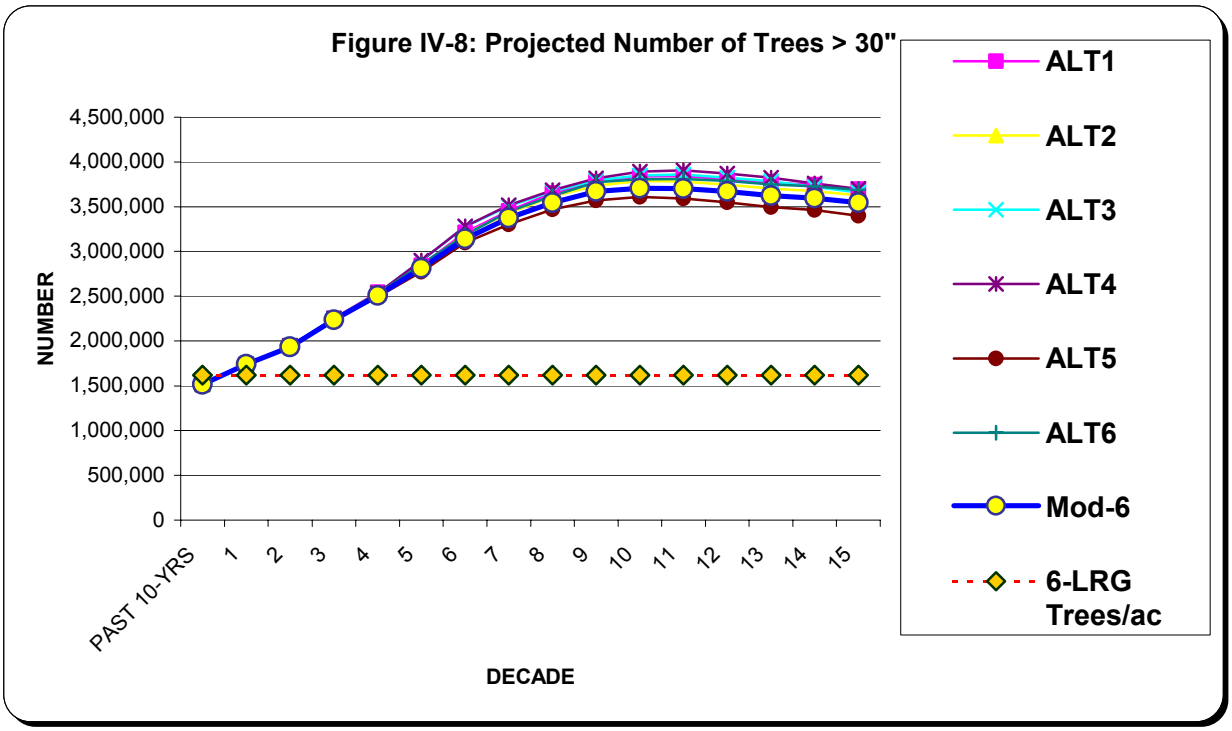
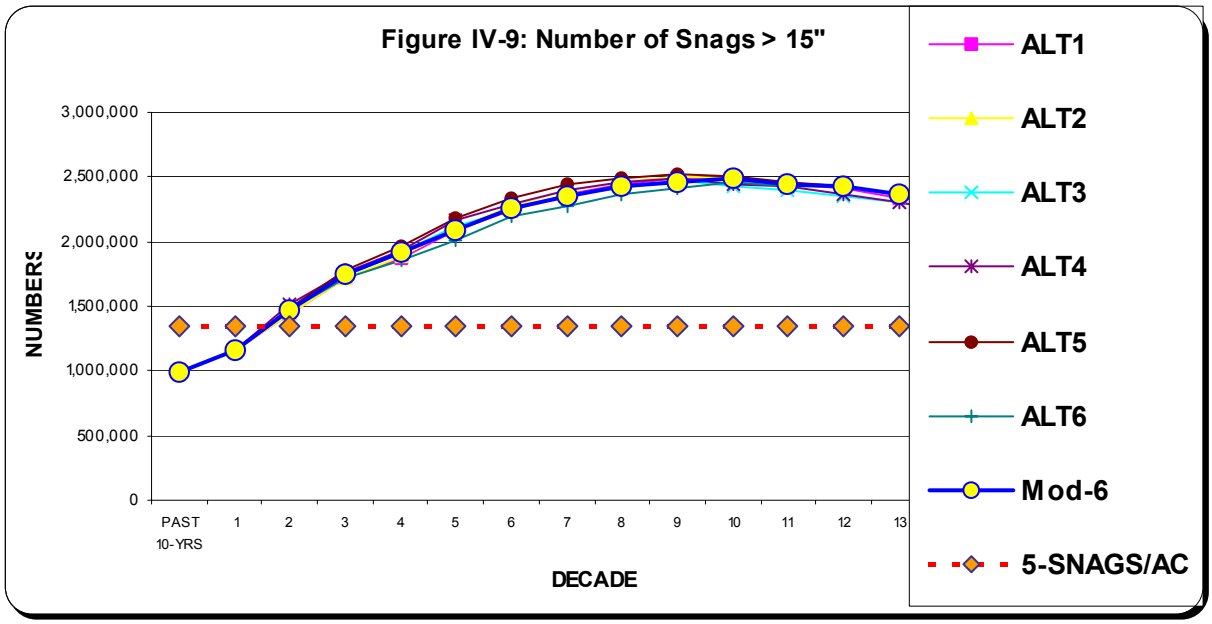
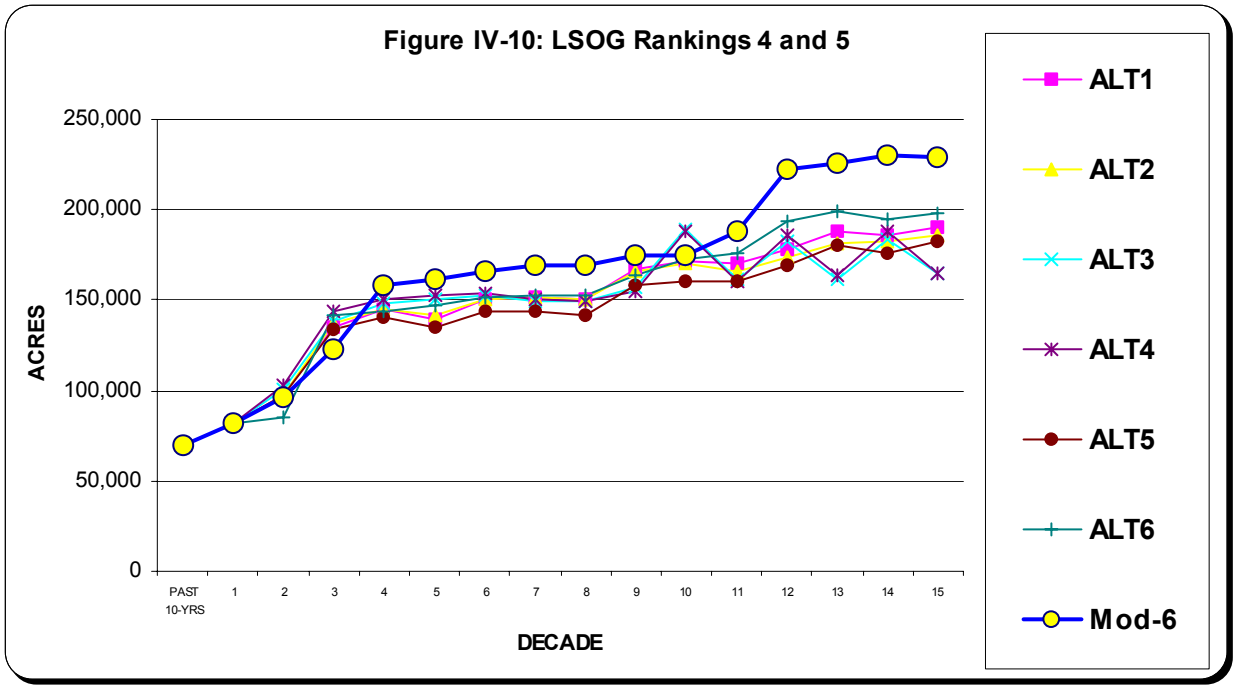


Figure IV-8: Projected Number of Trees > 30"
NUMBER
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
PAST 10-YRS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
DECADE
ALT1
ALT2
ALT3
ALT4
ALT5
ALT6
Mod-6
6-LRG Trees/ac

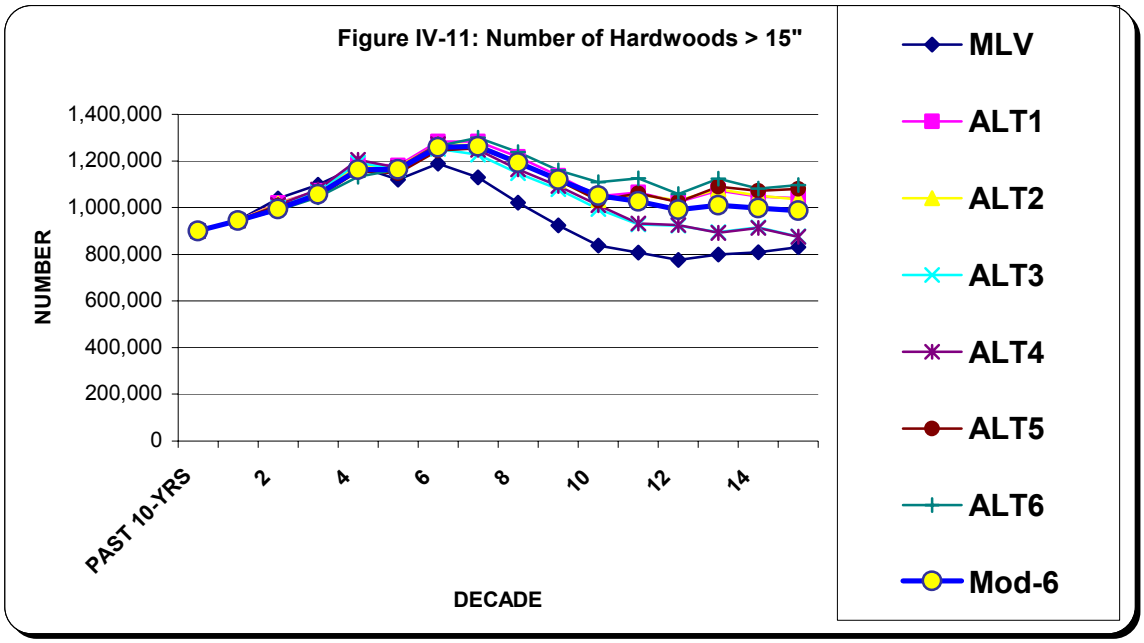




(4) Lower Westside Hardwoods

All Alternatives. All alternatives would follow Framework direction to specifically favor hardwoods where they naturally exist. Modeling shows gains of 30% to 40% in the number of hardwoods 15 inches in diameter per acre through the 7th decade. Although, after seven decades, modeling shows a decline in hardwoods over 15 inches in diameter, it is likely that hardwoods would increase under all alternatives and that this increase would be sustained over time. This

would be due to a more open canopy, which would help to maintain and improve growth of existing oaks. The more open character of the wildland urban intermix would favor retention of hardwoods where they naturally exist. This might limit use by gray squirrels, if not carefully planned, since they prefer interconnected crowns for travel and to avoid predation.



c) Wildlife Species At Risk

Effects would vary depending on a species' habitat requirements, mobility, and sensitivity to human disturbance. Each of these species are conserved under Forest Service regulation and policy or fully protected by the Endangered Species Act. Species protection and maintenance of viability are addressed here, at the programmatic level, and will be addressed during each site-specific project analysis. Not all species at risk within the Monument are addressed here. They are addressed only if there are specific consequences to the species as a result of proposed management actions. All species are addressed in greater detail in the Biological Assessment for the Monument FEIS (on file in the Sequoia National Forest Supervisor's Office).

Potential development of new recreation facilities, their associated roads, and increased recreation use would be unlikely to negatively impact these species. This is due to the provided management direction and the limited scope of potential development (less than 200 acres and less than ten miles of roads for recreation development). The actual effects of predicted increases in recreation use are

unknown. Identification of impacts and resulting management actions would be based on monitoring results.

(1) Valley elderberry long-horned beetle

All Alternatives, Direct and Indirect Effects. This beetle would likely benefit from activities that restore the role of fire to chaparral ecosystems. Elderberries sprout after fires and may benefit from reduced competition after prescribed burns. The shrubs are not highly flammable and can generally be protected to varying degrees by timing and pattern of ignition. Complete loss under prescribed conditions is unlikely, whereas under wildfire conditions complete loss is likely. All alternatives would have a beneficial effect on this beetle; however, limitations on the use of mechanical pre-treatment in chaparral in Alternative 3 and 4 might limit options for the protection of elderberries. Project-level mitigation would be needed to offset or minimize loss of elderberry shrubs. Due to the low incidence of valley elderberry beetles in the Monument, the efforts to protect elderberry during project implementation, and the potential beneficial effects of the proposed management, it is unlikely that any of the alternatives presented would have an adverse effect in the long term. Timing and other management tools, including reasonable and prudent measures provided by the Fish and Wildlife Service, would be used at the project level to minimize or eliminate short-term harm or species take.

All Alternatives, Cumulative Effects. Wildfire in chaparral is often a natural stand-replacing event. Generally the more mesic habitats occupied by elderberry do not burn at high intensity as does much of the rest of the chaparral community. However, continued fire exclusion would tend to allow fuel to build up to the point that more intense fire effects are likely over time. .

(2) California condor

All Alternatives, Direct and Indirect Effects. Chaparral burning and treatment of fuels in the oak belt would increase condor habitat. They would result in better availability of food, as well as increased openings and large snags necessary for foraging and roost sites for the condor. A limited operating period would apply to grove activities in all alternatives if condors are in the area and are likely to be selecting a nest tree. The small openings and thinning proposed in groves in Alternatives 5 and 6 would be unlikely to adversely affect the quality of nesting habitat for condors and might improve foraging in the area surrounding potential nest trees. Consultation on the Framework indicated there was a potential for adverse effects due to the potential to burn roost trees. Project-level consultation has resulted in provisions for protecting roost trees. Larger openings in the chaparral/oak woodland belt would be beneficial to the condor for foraging and creating new roost trees. With the protection of roost trees and limitations on activities near potential roost trees, it is unlikely that there would be adverse effects on condors.

All Alternatives, Cumulative Effects. All alternatives would increase food availability, increase roost trees and openings for foraging, and protect potential nest trees in the Monument. Urban development in foothill habitats on private lands could encroach on condor habitat outside the Monument.

(3) California spotted owl, northern goshawk, Pacific fisher, and American marten.

These species have slightly different habitat requirements, but also have several elements in common. Common elements that would be affected by the alternatives include numbers of large trees, spotted owl habitat, snags, down logs, canopy closure, and proportion of the landscape with canopy closure over 40%. A discussion of spotted owl habitat, large trees, and snags is included in the previous section on late seral habitat.

Alternatives 1, 2, and 5. Outcomes for Alternatives 1, 2, and 5 follow Framework guidance for protection or retention of down logs and canopy closure (see Appendix D for a summary of Framework guidance). These alternatives would be expected to adequately protect these habitat features.

Alternatives 3 and 4. Alternatives 3 and 4 would follow Framework guidance for protection or retention of down logs and canopy closure, except where Framework guidelines recommend use of mechanical methods for vegetation treatments. These alternatives would be expected to adequately protect these habitat features to the extent that prescribed fire can be applied effectively. Risk of loss of habitat features due to escaped fire or hotter than intended fires would be greater in these alternatives.

Alternative 6. Alternative 6 would not follow the Framework guideline for 60% canopy closure over 60% of watersheds in trees greater than 11 inches in diameter. Analysis for the Monument indicates that 51% of the watersheds with fisher habitat currently meet this standard. Many of the stands in excess of 60% canopy closure are second growth, dominated by small trees with a dense understory and high fuel loadings. These stands are highly susceptible to loss from a wildfire and are a threat to adjacent communities, giant sequoia groves, and high quality LSOG habitat. Habitat occupancy in these second growth stands varies. Thinning within these stands would have the greatest potential to reduce risk from severe wildfire to occupied habitat and to increase the size and development of multiple-layered canopies in stands that do not currently support occupancy. This alternative would be expected to adequately protect these habitat features. Eliminating the Framework guideline for 60% canopy closure over 60% of the watersheds shifts the burden of habitat protection to site-specific project analysis and therefore increases the risk of inadvertent disturbance.

Fuels reduction would focus on fisher foraging habitat with smaller, dense trees and that has a high risk of stand-replacing fire, while avoiding treatment of stands with dense larger trees or den trees. Since this kind of analysis changes with landscape conditions and is intended to be adaptive to the latest science and monitoring information, it is difficult to give a single set of rigid standards that do not vary by condition or that solve for unknown information. This flexible, results driven, and adaptive management is what is envisioned in Alternative 6.

Modified Alternative 6. As a result of comments received on the Monument DEIS, Modified Alternative 6 incorporates additional management direction to protect old forest habitat, with a particular focus on protection of fisher habitat and populations. A new allocation, Fisher Old Forest (FOF), is included in this alternative to assure protection of old forest habitat and associated species.

The FOF allocation would combine the Framework allocations of Old Forest Emphasis Area, Southern Sierra Fisher Conservation Area, and General Forest into a single allocation. The FOF allocation, in addition to the standards and guidelines for those three Framework allocations, would include additional standards and guidelines to increase the protection of important habitat and habitat elements for old forest-dependent species (see the list of standards and guidelines for Modified Alternative 6 in Chapter II).

Additional direction provided in Modified Alternative 6 for the FOF allocation would include:

- Develop fuel treatment and restoration strategies during landscape analysis to protect communities and retain or develop 50% of potential fisher habitat as high quality habitat.
- Assume high quality fisher habitat is occupied unless surveys indicate otherwise.
- Treat no more than 10% of occupied, high quality fisher habitat per project.
- After initial projects in high quality fisher habitat, conduct monitoring to document habitat changes and population responses and use this monitoring data and applicable science to adapt future treatments.
- Use a peer review process to evaluate protection and restoration strategies if landscape analysis indicates: 1) the strategies would reduce occupied, high quality fisher habitat to below 50% in a watershed; 2) a watershed currently has less than 50% high quality fisher habitat; or 3) more than 10% of the high quality, unoccupied fisher habitat in a watershed is proposed for treatment.
- Prior to vegetation treatments, identify and design measures to protect important wildlife structures within treatment units, such as large snags and oaks, patches of dense large trees with cavities, clumps of small understory trees, and coarse woody debris.

- When mechanical treatments are necessary, avoid reducing the pre-existing canopy cover by more than 30% (i.e., do not reduce 80% canopy cover below 50%).
- Identify a 700-acre buffer for each known fisher den site. Within den site buffers, avoid vegetation treatments. When treatment is necessary, emphasize mechanical treatments and use a limited operating period to protect den sites.
- Protect den sites from disturbance due to new or existing roads, recreational trails, and other developments.

Modified Alternative 6 would modify the Framework guideline for 60% canopy closure over 60% of the watershed, in trees greater than 11 inches in diameter. In this alternative the guideline would be 60% canopy closure over 50% of the watershed. This is based on local information regarding fisher habitat and the need to protect habitat, communities, and other valuable resources from the effects of severe wildfire. Modified Alternative 6 would place greater emphasis on scheduling, on limiting treated areas, and adaptive management to meet both the needs of the fisher and the objective of reducing risk to communities. This alternative would be expected to provide better protection for old forest habitat and habitat features than the other alternatives.

Cumulative Effects. Cumulative effects on mature forest conditions and suitable habitats for associated species are shown above. Cumulative effects at the landscape level for the Sierra Nevada are addressed in detail in the Framework FEIS. Additional factors not addressed in the Framework include potential effects as a result of the Kings River Administrative Study and changes to the Framework in the draft supplemental EIS for that analysis. The Kings River Administrative Study proposes to treat suitable fisher and spotted owl habitat while tracking effects on the species. Since neither of these actions are final, cumulative effects cannot be quantified.

Cumulative effects on mature forest habitat would include loss of habitat to stand-replacing wildfire. All of the action alternatives would reduce the acreage of wildfires that degrade old forest habitat (lethal and mixed lethal fires). Modified Alternative 6 would have the greatest effect on reducing damaging wildfires, from an average of approximately 13,000 acres per year to about 7,500 acres per year after 20 years, and approximately 4,700 acres per year after 50 years.

The effects of reducing the acres of wildfires are difficult to quantify due to their unpredictable nature. Projections of wildfire occurrence are based on averages, but an actual fire's location, size, and effect on habitat are extremely variable. However, data gathered in the Sierra Nevada bioregion indicate that wildfires have had an impact on old forest habitat. Since more information is available on spotted owl distribution than most other species at risk, fire effects on spotted owls are used as a proxy for effects to other mature forest species. Over 40% of the PACs within the Sierra Nevada bioregion have experienced some level of fire since 1970. Twenty-eight of those have experienced fire at least twice. Most

of these fires led to total or partial loss of PACs. Over this period of time, 47 PACs have experienced fire and 18 could be considered lost. Some of the PACs identified above have replacement acres within their surrounding home range core areas (HRCAs). Others have little to no options for replacement and will be removed from the system. There has been an average of 4½ PACs lost or severely modified per year since 1998. This equates to an annual loss of approximately 0.34% per year.

The time necessary for natural replacement of burned PACs varies based on the size and intensity of the fire. Areas burned by large fires with few surviving seed trees may never regenerate naturally or only on geologic time scales, depending on climate changes. Treatments under all alternatives would be designed to reduce the effects of stand-replacing fire. They would not prevent or eliminate fire, but would be intended to allow fire to return to a natural regime, where it can travel with low intensity over large areas, creating gaps of varying size but generally not large enough to inhibit reseeding from adjacent trees.

Foothill and Mountain Yellow-Legged Frogs. Effects on foothill and mountain yellow-legged frogs would not vary greatly by alternative. Both species are highly aquatic and are unlikely to be directly affected by the proposed treatments. The grazing guidelines from the Framework will be used in the Monument, and effects are addressed in that document.

There would be the potential for indirect effects, both beneficial and adverse, from fuels reduction, road closure, and increased recreational traffic. These effects would not be the causative factors likely to contribute to or reverse a trend leading to federal listing of these species.

Neotropical Migratory Birds. Habitat modification might affect neotropical migratory birds. Most changes in habitat would benefit some species and adversely affect others. Fire exclusion might benefit some species such as Swainson's thrush, light underburns might benefit other species, and stand-replacing fire might benefit open field-nesting species such as white crowned sparrows. This places an emphasis on the need for a mosaic of habitats across the landscape, as disturbances provide habitat for some species, and mid and late seral stages provide habitat for others. The Framework provides greater detail on the effects to individual species.

C. Human Use

1. Heritage Resources

a) All Alternatives

In all alternatives, the cultural resource program would provide support to all resource projects, as required by Section 106 of the National Historic Preservation

Act. The program would include inventory, analysis, stabilization, and public interpretation.

Despite inventories, the potential exists for undiscovered sites to be exposed and/or damaged by surface disturbance or other events. These sites may or may not be noticed in time to allow mitigation. This damage represents an unavoidable adverse effect, present in all alternatives.

All alternatives will have some irreversible commitments of heritage resources. Examples are inadvertently damaged or destroyed sites, vandalized or looted sites, and sites that have not been inventoried and recorded and are undergoing loss from natural processes. Every alternative seeks to minimize this loss through inventory and evaluation, monitoring, and improved project implementation to ensure that this loss is kept to an absolute minimum.

There is a direct relationship between the numbers of acres disturbed through project implementation and the number of acres surveyed for heritage sites. This relationship also exists for the number of heritage sites located and evaluated. Alternatives that result in more acres of planned management activities could reduce adverse effects, because more inventory and evaluation would be required under these alternatives. Eligible sites would be avoided or mitigation of effects would occur during project implementation.

Direct effects could result both from natural events and human activities that could damage heritage resources or alter their settings such as surface disturbance, soil compaction, erosion, heating and freezing, wildfire, prescribed burning, livestock trampling, alteration of a heritage resource setting (including introduction of atmospheric or audible intrusions), and potential loss of protection for undiscovered heritage resources if land is transferred from federal to non-federal ownership. Indirect effects could result from improved access that brings more visitors, potentially resulting in increased vandalism, removal of materials, inadvertent damage or fires, or scenic and auditory changes from adjacent or nearby activities.

Cumulative effects over time could include loss of sites, loss of interpretive values, and incremental loss of the heritage resource base. Management activities could cause surface disturbance, bring additional people in contact with heritage resources, or affect the fabric of historic structures. The difference in cumulative effects to heritage resources under the different alternatives should be limited due to the protection and mitigation measures that would be implemented.

Cumulative effects could also occur to heritage resources as a result of unplanned activities such as vandalism or illegal excavation. Efforts to control and monitor these activities would be similar in all alternatives and would result in an extremely low level of cumulative adverse effects to heritage resources.

Alternatives that result in more acres of planned management activities could reduce adverse cumulative effects. This is because more inventory and evaluation

would be required under these alternatives. Additional inventory and evaluation would lead to the location of more heritage resources and a reduction of adverse cumulative effects caused by natural processes.

A growing emphasis on American Indian input to the management of the Monument has the possibility of broadening our understanding and awareness. The oral histories and lore of the American Indians would be complimentary to scientific information, providing a more in-depth and rich interpretation of the broader cultural landscape.

The National Historic Preservation Act defines effects to heritage resources as including those resulting from transfer from federal ownership. Potential effects include loss of federal protection for heritage resources on lands transferred to other ownership, which could result in damage or destruction of heritage sites. However, prior to landownership transfer, inventories would be conducted and mitigation applied, if needed. As a result of these inventories there would be the potential to locate eligible sites. That potential would be the same under all alternatives.

Heritage resources on lands acquired from other ownerships are accorded protection under federal law. Potential effects on heritage resources would depend on activities subsequently planned for the land.

b) Effects from Recreation Management

Direct effects could occur from construction or reconstruction of campgrounds and trampling of heritage resources by people and vehicles. For planned recreation developments, most of the potential direct effects can be eliminated or mitigated. However, indirect effects, such as the potential for increased vandalism, trampling, loss of integrity and increased erosion cannot be completely mitigated, because inventories are not usually conducted outside the limits of the developed sites.

An increase in dispersed camping could damage or destroy vegetation, inorganic surface crusts, and natural ground litter. Increased looting and vandalism might occur. In addition, driving over heritage sites could cause extensive direct damage with the compaction of soils, alteration of soil stratigraphy and reduced water-infiltration rates. These effects could occur under any alternative, but in Alternative 3, the potential for this type of negative effect would be greatly reduced, since access would be reduced. The number of sites potentially affected is not quantifiable at this time.

c) Effects from Fire and Fuels Management

Prescribed burning and wildfires would have the potential to directly affect heritage sites by burning historic structures and damaging or destroying artifacts and features of archeological sites. Activities carried out in emergency situations to control a wildfire, including construction of fire lines, could also directly damage

heritage resources. Indirect effects of fire would include erosion losses resulting from burned vegetation cover; extreme temperatures, or changes in the landscape adjacent to sites that are initially damaged by deterioration and weathering that alter the matrix of artifacts and features.

Fuels management activities could affect heritage resources through surface disturbance caused by machinery and vehicles, by felling trees on certain types of sites, by theft or vandalism caused by workers, or by erosion caused by vegetation removal or damage. In addition, fuels and oils used by heavy equipment could be spilled or dumped on heritage sites. Construction or reconstruction of permanent or temporary roads would have the potential to affect heritage resources through damage or destruction. However, eligible sites would be avoided, or mitigation of effects would occur. Effects to heritage sites would be mitigated.

Effects to heritage resources would tend to be greater in wildfire situations because of extreme temperatures, an inability to control the effects, and because it is almost impossible to plan inventories in advance. Some inventories might be conducted on fire lines. Fire effects could be determined and appropriate mitigation carried out if a complete inventory of the burned area is conducted shortly after the fire is controlled, but this is not always possible. Therefore, potentially significant effects from wildfire could go undetermined under all alternatives. The number of heritage resources affected by wildfire on an annual basis cannot be predicted.

d) Effects from Grazing

Range-related management activities would have the potential to alter or destroy heritage resources. These activities include fence construction, spring developments, wells, stock tanks, pumps, pipelines, water storage and cattle guards, and non-structural projects such as noxious weed treatments, forage improvement and livestock grazing. Livestock grazing, especially where animals congregate or use trails, creates impacts to heritage resources. Sites exposed by grazing might be more prone to removal, collecting, or vandalism by people. These effects would be direct, indirect and cumulative. The stratigraphic layers, so important to defining cultural chronologies, could be churned and distorted by livestock digging, movements, and congregation. These same effects could be caused by wild herbivores and small mammals that use areas that may be heritage sites. This type of wildlife could increase in numbers due to range improvements such as wells. These heritage sites are often located near springs, drainages, and forest edges. Under any alternative, a cultural inventory would be necessary to prevent further damage, mitigate unforeseen damage, and prevent future impacts to sites.

2. Recreation

a) All Alternatives

The alternatives for managing the recreation resources in the Monument are designed to follow the intent and spirit of the Proclamation. The effects of managing the Monument according to the Proclamation, management strategies, management goals, and standards and guidelines, as outlined in the alternatives, are discussed here.

Recreation use would continue to increase in the Monument. Recreation use would be estimated to increase by 15-20% over the next decade for all alternatives except Alternative 3. The increase would be expected to be about half as much in Alternative 3, due to a decrease in access and possible loss of some recreation facilities.

Fees would continue to be charged for use of most developed campgrounds that offer services such as water, toilets, fire pits, tables, and parking. Some camping sites that offer limited facilities would be available at no charge. Public access and dispersed use in undeveloped areas would be available and allowed, but the amount varies by alternative. The expected increase in dispersed use within the Monument would heighten congestion, increase soil compaction problems in areas currently overcrowded, or cause soil compaction in areas not currently impacted. The need for law enforcement and resource protection efforts would be likely to increase. With more visitations, more people would be interested in visiting the groves, which might affect grove management objectives.

Approximately 20 miles of trails in the Kings River Special Management Area would be open for use by OHVs. The sights and sounds of OHV use would continue in the vicinity of those trails (see the Recreation section of Chapter III for a discussion of OHV use in the Kings River Special Management Area).

The boundaries and regulations for Congressionally designated areas including the Monarch and Golden Trout Wilderness Areas, the Kings and Kern Wild and Scenic Rivers, and the Kings River Special Management Area would not be changed.

Historically, funding for recreation facilities such as campgrounds, trailheads, or interpretive sites has not kept pace with public demand or maintenance needs. Deferred maintenance (scheduled maintenance that is not accomplished) has been increasing for several years. Currently the emphasis on national forests is to reduce deferred maintenance, rather than develop new facilities. If funding for recreation management remains at or near recent levels, deferred maintenance would continue to increase, the condition of facilities would deteriorate, and funds for new developments would be limited.

Funding for managing national forest system lands comes primarily from congressional allocations. Funding sources for development, reconstruction, and maintenance of recreation facilities could be enhanced through public-private ventures, use of volunteer labor, donations, or increased fees at recreation sites. The Proclamation did not provide any additional funding for managing or developing the Monument.

Beginning in fiscal year 2003, the Sequoia National Forest began a survey of recreation users through the National Visitor Use Monitoring Project, using statistically valid sampling methodology. This will provide more reliable estimates of recreation use than previously recorded and help determine the demand for future recreation opportunities.

One feature of the Proclamation may need clarification. While the Proclamation limits the use of motorized vehicles to designated roads, and limits mechanized vehicles (such as bicycles) to designated roads and trails, it also exempts persons with disabilities from these limitations. This exemption does not mean that persons with disabilities are allowed to travel wherever they desire with whatever mode of transportation they desire. A person with a disability would be able to use a wheelchair, either mechanical or electric, on roads or trails. However, using an off-highway or all-terrain vehicle off of designated roads would not be allowed. A wheelchair is defined as a device that is designed solely for use by a mobility-impaired individual for locomotion that is suitable for use in an indoor pedestrian area (Americans with Disabilities Act, 1990). A device powered by an internal combustion engine would not fit that definition.

Visitors to the Monument might experience the sights, sounds, and traffic associated with management activities such as prescribed fire, hand treatment, or mechanical treatment. Visitors might experience smoke and views of burned vegetation from prescribed fires; sounds, sights, and dust from mechanical equipment; views of cut or crushed vegetation following vegetation treatment; and traffic associated with management activities. The impact to visitors experience from management activities would be variable. Some see signs of management activity as a positive experience. Others find sights of management activity as a negative that detracts from their experience. The effects of management activity on Monument visitors' recreation experiences are unknown.

b) Alternative 1

Alternative 1 would continue to use current direction for managing recreation use in the Monument. See the Recreation section of Chapter III for a description of the current recreation opportunities in the Monument, as well as Figure II-3 in the Map Packet.

Alternative 1 would not fully address the recreation issue as stated in Chapter I, which deals with the level of development that is appropriate in the Monument.

Existing campgrounds, picnic areas, and interpretive sites might be reconstructed, or new facilities might be constructed to increase the quality and variety of recreation opportunities in the Monument. However, there are no specific goals to guide the level of development of recreation facilities and no current plans for development of additional recreation sites. Alternative 1 would not be expected to change the capacity for People At One Time (PAOT) in the next decade at developed recreation facilities. Because recreation use is expected to increase during this time period, campground occupancy rates would be expected to increase. Overcrowding would likely occur more frequently at developed sites such as campgrounds, picnic areas, and interpretive sites. Currently, occupancy rates at campgrounds average 75 to 85% on peak weekends. Once occupancy rates reach 60%, some people begin to feel crowded. The resulting sense of feeling crowded by campers would also increase.

Many of the existing recreation facilities would not meet visitors' changing needs in terms of larger family group sites, access for larger vehicles, and accessibility for people with disabilities. Consequently, the ability to meet visitor expectations would continue to decline as demand outstrips the facilities' abilities to accommodate them.

Overnight facilities in the Hume Lake Basin, in accordance with the 1988 Forest Plan, would not be expanded. Only projects that enhance dispersed day-use recreation would occur (Forest Plan, page 4-21).

The Recreation Opportunity Spectrum (ROS) classifications would not change from those developed for the Forest Plan and the 1990 Mediated Settlement Agreement. ROS is a means of classifying and managing recreation opportunities based on the physical, social, and managerial setting. ROS classes range from primitive settings, where natural settings dominate, to highly developed urban settings, where structures, highways, and streets dominate. Approximately 10% (32,600 acres) of the Monument would be in the Semi-Primitive Non-Motorized class, 12% (39,200 acres) would be in the Semi-Primitive Motorized class, 77% (251,300 acres) would be in the Roaded Natural class, and 1% (3,300 acres) would be in the Rural class. There would be no areas in the Primitive or Urban classes in the Monument.

Under this alternative, the trail system would provide dispersed recreation opportunities on approximately 160 miles of trails, 12 trailheads with parking and restrooms, and 10 small trailheads with limited parking and no restrooms. No expansion of the trail system would be expected. The winter recreation program would continue providing snow grooming on roads for snowmobiles, cross-country skiers, and snowshoers at existing locations (seven trailheads and up to 135 miles of groomed trails). The snow-grooming program is dependent on funding from the California Off-Highway Vehicle Program. The snow parks, where snow is cleared for vehicle parking, would continue to be maintained as well. No new winter recreation trails or snow park areas are currently under consideration or are reasonably foreseeable, and facilities for winter use of the Monument would not be expected to increase.

The current road system (approximately 900 miles) would be available for public use and would continue to provide access to existing developed and dispersed recreation sites, for viewing the magnificent scenery and wildlife of the southern Sierra Nevada, and for driving to special places for solitude and personal gratification. Off-highway and over-snow vehicle use would continue on designated roads only, as allowed in the Proclamation.

The expected increase in dispersed use within the Monument (15 to 20% in the next decade) might heighten congestion and increase soil compaction problems in areas currently overcrowded or overused and expand the need for law enforcement and resource protection efforts.

c) All Action Alternatives (Alternatives 2, 3, 4, 5, 6, and Modified 6)

As described in Chapter II, recreation opportunity areas (ROAs) have been identified for all action alternatives and are mapped in Figure II-3. These areas are identified as areas that have high potential for development of future recreation facilities or opportunities. While the recreation opportunity areas have high potential for future recreation development, they are not the only areas where recreation opportunities could be developed.

In addition to identified areas with high potential for development, lists of potential recreation development opportunities are included below, by alternative or combination of alternatives. These lists are included to display facilities that could help meet the expected demand for recreation in the Monument. These opportunities are based on estimates provided by Monument recreation managers. All of the potential sites for development or relocation, for all alternatives, are displayed on Figure II-3 of the Map Packet. Specific decisions on the location and type of recreation development would be made in site-specific project analyses. All new facility development would meet the requirements for persons with disabilities. As new needs become known and trends change, other facilities or opportunities might be developed.

Current Forest Plan guidance that limits development of overnight facilities in the Hume Lake Basin would be superseded The Hume Lake Basin Recreation Action Plan would be completed and provide guidance for development of overnight facilities, day use facilities, and conservation education and/or interpretive opportunities. New facilities would focus on the historic and cultural resources surrounding the creation and use of Hume Lake.

The Recreation Opportunity Spectrum classes (see Figure III-11) would be the same for all action alternatives. ROS is a means of classifying and managing recreation opportunities based on the physical, social, and managerial setting. ROS classes range from primitive settings, where natural settings dominate, to highly developed urban settings, where structures, highways, and streets dominate. The

ROS classes for the action alternatives were adjusted to reflect changes resulting from the creation of the Monument. The Proclamation focused additional attention on preserving the natural features and beauty of the Monument and reduced motorized access on trails. The overall effect would be to add area to the lesser-developed classes and provide greater opportunities for non-motorized activities. The approximate acres would be as follows: Semi-Primitive Non-Motorized – 58,700; Semi-Primitive Motorized – 45,700; Roaded Natural – 218,700; and Rural – 3,300. These acreages represent an addition of 26,100 acres in Semi-Primitive Non-Motorized, an addition of 6,500 acres in Semi-Primitive Motorized, a reduction of 32,600 acres in Roaded Natural, and no change in the Rural class.

The transportation system would maintain access to developed recreation facilities and the concentrated use areas identified in the affected environment (Chapter III). The mileage of roads providing public access for dispersed use would vary in some alternatives. Mountain bikes would be allowed on roads and most trails throughout the Monument. Trails closed to mountain bikes would be signed. Trail opportunities and mileage are likely to increase in all alternatives. Increased visitation and tourism in the Monument would attract tourists and encourage economic stimulus opportunities in local communities. Tourism traffic would remain high along the Highway 180 National Forest Scenic Byway and Generals Highway corridors in the northern portion of the Monument. Primary entrance corridors to and from the southern portion of the Monument would remain along the Highway 190 corridor through Springville, the Road M99 corridor through Kernville, and the M56/M50 corridor through California Hot Springs. Each of these corridors displays botanic, biologic, geologic, and historic features that combine to provide interest for visitors and meets the criteria for scenic byway nomination. The Highway 190, Western Divide, and Parker Pass corridors would be studied for possible inclusion in the Forest Service scenic byway system.

Designation of the Highway 190, Western Divide, and Parker Pass road corridors as Forest Service scenic byways might result in an increase in people driving for pleasure on these road corridors that would add more traffic to the road system. Designation of new scenic byways might provide more business throughout the year to local communities such as Springville, Camp Nelson, Kernville, and California Hot Springs, as well as to businesses that are located along or near the scenic byway routes. Designation of new scenic byways would provide opportunities to improve visitor facilities and services by cooperating with permittees; cooperators; local, county, state, and federal agencies; tribal governments; recreational user groups; and the business community. The Forest Service has programs to assist local communities, through economic development grants. The Sequoia National Forest and Monument would continue to encourage and assist communities in applying for grants to improve and expand the local economic base.

Enhanced conservation, education, and interpretive services would inform the visiting public of the natural features and history of the Monument. Education would also increase public awareness and understanding of the important issues and

decisions that are part of managing the Monument. Increased understanding may lead to a more informed public and greater participation in the management decision process in the Monument.

d) Alternatives 2, 5, 6, and Modified 6

The management direction in Alternatives 2, 5, 6 and Modified 6 encourages increasing facilities and opportunities to meet the public demand for recreation. In order to meet the estimated increase in demand for recreation (approximately 15-20% in the next decade) new opportunities would need to be provided, new facilities would need to be constructed, and existing facilities would require maintenance.

These alternatives would encourage development and reconstruction of single-family campgrounds, group campgrounds, picnic areas, trails and trailheads, interpretive sites, and other appropriate recreation facilities and opportunities. Expansion of these types of facilities would increase the capacity of recreation facilities and opportunities for the public in the Monument. Development opportunities listed below (and shown on Figure II-3 in the Map Packet) are based on estimates provided by recreation managers within the Monument. Development of any of these proposed facilities would require a site-specific project analysis before any additions or changes could occur.

As new facilities are developed, the costs for development and maintenance of recreation facilities would increase. The ability of these, and any other, alternatives to meet demand would depend partially on the level of funding available.

Potential Recreation Development	Change in Capacity
Single Family Campgrounds Stony Creek expansion, Hume Lake upgrade, Big Meadow relocation and expansion, Buck Rock expansion, Tenmile expansion, Upper Peppermint relocation and expansion, Wishon relocation and expansion, Lower Peppermint relocation and expansion.	Expansions at these facilities could increase capacity by up to 75% for overnight camping.
Group Campgrounds Stony Creek development, Wishon development, Holey Meadow reconstruction and expansion, Long Meadow reconstruction and expansion.	Development or expansion of these facilities could increase capacity by up to 35%.
Picnic Sites Stony Creek development, Big Meadow winter trailhead development, Princess development, Cherry Gap development, Dome Rock development.	Development of these facilities could increase capacity by up to 70%.
Interpretive and Education Sites Wishon Interpretive Trail upgrade, Needles Trail upgrade, Hume Lake museum and amphitheater development, Converse Basin interpretive trail and amphitheater, Trail of 100 Giants upgrade.	Development or upgrades at these facilities could increase capacity by up to 45%.
Trails and Trailheads Stony Creek trail reconstruction, Marvin Pass trailhead improvement, Horse Corral parking expansion, Converse Basin trailhead development, Camp Nelson trail reconstruction and development, Deer and Capinero trail reconstruction, Western Divide and Lloyd Meadow Corridors trail development, Needles vista and climber trailhead development.	Development or reconstruction of these trail facilities could increase capacity by up to 25%.
Road Access for Dispersed Recreation Retain current roads for public access.	No change in dispersed recreation accessed by roads.

(1) Overnight Camping and Picnic Sites

Expansion of single-family campgrounds, group campgrounds, and picnic sites would have the potential to increase capacity for these types of facilities by up to 70%, from 3225 People At One Time (PAOT) to 5525 PAOT. This level of expansion would require development equal to all of the identified recreation development opportunities listed above. The actual level of expansion would depend on public demand, funding, and site-specific analysis for each project.

New roads to provide access to these facilities would be estimated to add approximately 1.2 miles to the existing road system. In addition to the access roads, new interior roads to reach campsites and parking spurs within these facilities are estimated to add from 3.0 to 5.2 miles of road to the existing road

system. These new facilities would occupy approximately 180 acres of land (.05% of the Monument).

To the extent that new facilities are developed, there might be less crowding for visitors and fewer days when campground occupancy rates exceed 60% (the point at which many people feel crowded). Traffic would increase on access roads, as would visitation in general. Impacts to natural resources and public safety due to increased traffic and visitation are unknown.

(2) Interpretation and Education

Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%, if all the identified recreation developments are built. The actual capacity of interpretive sites is unknown. This estimate is based on the number of existing interpretive sites (11) compared to the number of potential new sites identified by recreation managers (5).

To the extent that new interpretive facilities are developed, more people would have access to interpretive and educational information regarding the Monument. This would lead to an increase in awareness of the Monument and its natural and human history. The interpretive development opportunities would include additional trails that provide access for people with disabilities.

Approximately 8 to 12 acres would be converted from undeveloped forestland to interpretive sites if all the identified interpretive developments are built (.004% of the Monument).

Traffic would likely increase on roads that provide access to interpretive sites. The impacts to natural resources and public safety due to increased traffic and visitation are unknown.

(3) Dispersed Recreation

Dispersed recreation is a term used to describe recreation activities that occur outside developed recreation sites such as campgrounds, picnic areas, or interpretive sites. Dispersed recreation includes activities such as trail use, camping outside developed campgrounds, exploring back roads, fishing, hunting, cross country skiing, sightseeing, off-highway vehicle use, nature study, or wildlife viewing.

Lands and roads in the Monument would be open for dispersed recreation use in Alternatives 2, 5, 6, and Modified 6, with some exceptions. For example, no dispersed camping would be allowed within developed campgrounds, administrative sites (ranger stations, work centers), or resorts, no off-highway vehicle or snowmobile use would be allowed off of designated roads; and no bicycle use would be allowed off of designated trails or in wilderness areas.

In these alternatives, dispersed recreation would provide the opportunity for the public to use and explore lands in the Monument in a natural-appearing environment. For example, the opportunity to select a suitable location for a primitive camping experience, without having to camp in a developed campground or pay a fee, would remain an option for Monument visitors. This would provide an opportunity that does not exist in many county, state, and national parks. The added challenges and risks associated with dispersed recreation would be available.

Alternatives 2, 5, 6, and Modified 6 would encourage dispersed recreation by retaining road access at levels similar to the current road system (approximately 900 miles of road). The designated road system would be open for public access, allowing visitors to recreate in areas that are not part of a developed facility. Visitors would be free to camp, picnic, explore, hike, and participate in many other outdoor activities in a natural-appearing setting. Approximately 640 miles of the designated road system would be available for riding OHVs. Snow grooming on roads for snowmobiling, cross-country skiing, and snowshoeing would continue if funding from the California Off-Highway Vehicle Program is available. Currently there are approximately 135 miles of roads in the Monument groomed for winter use, depending on snow conditions.

There would be no expected change in the capacity for dispersed recreation that is accessed by automobile along the road system. The small mileage of new roads that might result from developing new campgrounds, administrative sites, or for research needs would not add to the areas available for dispersed recreation that are accessible by automobile.

Expansion of the trail system would increase public access and dispersed recreation opportunities along trails. Currently there are approximately 160 miles of trail, 12 developed trailheads with parking and restrooms, and 10 small trailheads with limited parking and no restrooms. Trail development opportunities could increase the trail mileage by 18 to 20 miles. In addition, some old roads could be converted to trails (no mileage estimate has been completed), and about 10 miles of existing trails could be reconstructed to add bridges, retaining walls and switchbacks. Potential expansions would include three new trailheads and four trailhead expansions that would increase parking and trail access. Approximately 0.3 miles of new road would be constructed in the development of new trailheads. The combined increase in trail mileage, trailheads, and parking could be up to 25% of current availability. The impacts of increased trail use on natural resources are unknown.

In addition to the more detailed recreation development opportunities discussed above, other areas of emphasis for possible future recreation development are identified below.

In the northern portion of the Monument, emphasis would be given to dispersed activities and camping with few amenities at recreation opportunity areas in the

Millwood Recreation Opportunity Area (ROA), the Buck Rock ROA, and the Rowell/Horse Corral ROA (see Figure II-3 in the Map Packet). Highway 180 and the Generals Highway would receive priority for sightseeing, wildlife viewing, and nature interpretation. Winter dispersed use for snow play, snowmobiling, and cross-country skiing would be emphasized along the Generals Highway, in the Big Meadows ROA, and in the vicinity of the Indian Basin/Converse/Cherry Gap ROA. New winter recreation routes and/or parking facilities in association with the Hume Lake Historic Area would be evaluated for development.

In the southern portion of the Monument, emphasis for dispersed recreation opportunities would be placed on the Camp Wishon ROA to include trail opportunities to join with Mountain Home State Forest and to reach the Needles/Dome Rock ROA from the Western Divide Highway. Opportunities for wildlife viewing, camping with few amenities, and trails would be emphasized along the Lloyd Meadows Road Corridor. Parking facilities for winter recreation would be evaluated for improvement and expansion at the Sugarloaf winter trailhead, at the intersection of the North Road with Highway 190 in the Freeman Creek/Quaking Aspen ROA, and in the Needles/Dome Rock ROA.

e) Alternative 3

This alternative is responsive to the expected increases in demand for more primitive experiences and isolation from motorized use in the Monument. This alternative would concentrate human use and recreation in existing recreation facilities and the high profile giant sequoia groves, as well as encourage interpretation and education within these groves and the Hume Lake Historic Area. The high profile giant sequoia groves are Bearskin, approximately one-half of Belknap, Converse, Deer Creek, approximately two-thirds of Evans, Freeman Creek, Indian Basin, Long Meadow, and Packsaddle (see Figure II-5 in the Map Packet). Alternative 3 would expand day use opportunities, maintain the current capacity of developed overnight facilities, and reduce dispersed overnight use. Recreation facilities (campgrounds and picnic areas) located within the high profile giant sequoia groves, as well as trails and trailheads, would be improved and expanded where they would not have significant negative impacts on the groves or objects of interest.

To help meet increased demand for developed sites, reconstruction and/or expansion of existing campgrounds and picnic areas would be emphasized. Alternative 3 would emphasize evaluating and possibly relocating recreation facilities out of streamside areas to protect aquatic resources. The following sites are located in or near streamside zones in the northern portion of the Monument and would be evaluated for their impacts on aquatic resources: Tenmile, Landslide, and Logger Flat Campgrounds along Tenmile Creek; Eshom Campground along Eshom Creek; Upper Stony and Stony Creek Campgrounds along Stony Creek; Big Meadow Campground along Big Meadow Creek; and Boyden Cavern facilities and Mill Flat Campground along the Kings River. In the southern portion of the

Monument, sites in or near streamside zones are Upper and Lower Coffee Camp picnic areas along the Tule River, Wishon Campground along the North Fork of the Tule River, Belknap Campground at the confluence of Belknap Creek and the Middle Fork of the Tule River, Redwood Meadow and Long Meadow Campgrounds along Long Meadow Creek, Leavis Flat Campground along Deer Creek, White River Campground along White River, and Upper and Lower Peppermint Campgrounds along Peppermint Creek.

If campgrounds, picnic sites, or other recreation facilities are closed to reduce impacts to aquatic resources, they would be replaced by new facilities. The goal of Alternative 3 is to maintain the current capacity of overnight facilities in the Monument. If some overnight facilities are closed, new facilities would need to be constructed to keep capacity at current levels. Development opportunities listed below (and shown on Figure II-3 of the Map Packet) are based on estimates provided by recreation managers within the Monument. Development of any of these proposed facilities would require a site-specific project analysis before any additions or changes could occur.

As new facilities are decommissioned or developed, costs would increase. The ability of this, and any other, alternative to meet goals would depend partially on the level of funding available.

Potential Recreation Development	Change in Capacity
Single Family Campgrounds Stony Creek relocation/expansion, Hume Lake upgrade, Big Meadow relocation/expansion, Buck Rock expansion, Tenmile relocation/expansion, Upper Peppermint relocation/expansion, Wishon relocation/expansion, Lower Peppermint relocation/expansion.	Relocations and/or expansions at these facilities could replace lost capacity if existing campgrounds are closed due to conflicts with riparian areas or giant sequoia groves.
Group Campgrounds Stony Creek development, Wishon development, Holey Meadow reconstruction/expansion, Long Meadow relocation/expansion.	Development, relocation or expansion at these facilities could replace lost capacity if existing campgrounds are closed due to conflicts with riparian areas or giant sequoia groves.
Picnic Sites Stony Creek development, Big Meadow winter trailhead development, Princess development, Cherry Gap development, Dome Rock development.	Development of these facilities could increase capacity by up to 70%.
Interpretive and Education Sites Wishon Interpretive Trail upgrade, Needles Trail upgrade, Hume Lake museum and amphitheater development, Converse Basin interpretive trail and amphitheater, Trail of 100 Giants upgrade.	Development or upgrades at these facilities could increase capacity by up to 45%.
Trails and Trailheads Stony Creek trail reconstruction, Marvin Pass trailhead improvement, Horse Corral parking expansion, Converse Basin trailhead	Development or reconstruction of these trail facilities and conversion of closed roads to trails could increase capacity by 25 to 100 %.

development, Camp Nelson trail reconstruction and development, Deer and Capinero trail reconstruction, Western Divide and Lloyd Meadow Corridors trail development, Needles vista and climber trailhead development, conversion of closed roads to trails.	
Road Access for Dispersed Recreation Approximately 500 miles of roads available for public access.	45% reduction in dispersed recreation accessed by roads.

(1) Overnight Camping and Picnic Sites

The capacity of the campgrounds that are located in or near streamside zones that may be closed to reduce impacts to aquatic resources is 1420 PAOT. If all of those facilities were closed, new facilities would need to be developed to maintain capacity. The list of recreation development opportunities listed above has an estimated capacity of 2300 PAOT for replacing lost campground capacity. New campgrounds would not be developed in excess of the lost capacity. The actual level of relocation or replacement of overnight recreation facilities would depend on public demand, funding, and site-specific project analysis. The capacity of picnic facilities could increase by 185 PAOTs.

New roads to provide access to replacement facilities would be estimated to add approximately 1.2 miles to the existing road system. In addition to the access roads, new interior roads to reach campsites and parking spurs within these facilities would be estimated to add from 3.0 to 5.2 miles of road to the existing road system. The acreage of new campgrounds would be estimated to be 180 acres. As old facilities are decommissioned, the campsites and roads would be closed. The acreage of campgrounds and mileage of road closed would be assumed to be similar to that for new facilities. The net change in acreage of campgrounds and roads is expected to be very small.

To the extent that existing facilities are closed and replaced by new facilities, there would be no change in capacity for overnight stays in the Monument. As visitation increases, crowding would increase. Traffic would increase on access roads, as would visitation in general. Impacts to natural resources and public safety due to increased traffic and visitation are unknown.

(2) Interpretation and Education

Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%, if all the identified recreation developments are built. The Actual capacity of interpretive sites is unknown. This estimate is based on the number of existing interpretive sites (11) compared to the number of potential new sites identified by recreation managers (5).

To the extent that new interpretive facilities are developed, more people would have access to interpretive and educational information regarding the

Monument. This would lead to an increase in awareness of the Monument and its natural and human history. The interpretive development opportunities would include additional trails that provide access for people with disabilities.

Approximately 8 to 12 acres would be converted from undeveloped forestland to interpretive sites if all the identified interpretive developments are built (.004% of the Monument).

Traffic would likely increase on roads that provide access to interpretive sites. Impacts to natural resources and public safety due to increased traffic and visitation are unknown.

(3) Dispersed Recreation

Lands and roads in the Monument would be limited for dispersed recreation use in Alternative 3. No camping outside of developed recreation sites would be allowed in the High Profile Grove Management Area (an area of approximately 14,000 acres) and no OHV use would be allowed in the Monument outside of the Kings River Special Management Area. Dispersed recreation would be allowed in the rest of the Monument, with some exceptions. For example, no dispersed camping would be allowed within developed campgrounds, administrative sites (ranger stations, work centers), or resorts, and no bicycle use would be allowed off of designated trails or in wilderness areas.

Alternative 3 would provide reduced opportunities for dispersed recreation use. While the ability to select a suitable location for a primitive camping experience, without having to camp in a developed campground or pay a fee, would remain an option for Monument visitors, the area and access would be limited more than in other alternatives. Approximately 500 miles of the designated road system would be available for public use by automobile. This would be a reduction of about 45% from the current mileage of approximately 900 miles. There would be a similar expected reduction in the capacity for dispersed recreation accessible by automobile along the road system. The open roads would be available for public access, allowing visitors to recreate in areas that are not part of a developed facility. Visitors would be free to camp, picnic, explore, hike, sightsee, and participate in many other outdoor activities in a natural-appearing setting. This would provide an opportunity that does not exist in many county, state, and national parks. The added challenges and risks associated with dispersed recreation would be available.

People who are displaced by the reduced availability might choose to go elsewhere for dispersed recreation experiences. Some people could opt to use developed sites instead, which could worsen congestion problems in those sites. The reduction in access for dispersed recreation and the lack of increase in campground capacity would increase crowding, particularly in the northern portion of the Monument, as people visiting both the national parks and the

Monument seek a place to stay. The need for law enforcement and resource protection efforts would be likely to increase as use patterns change.

While Alternative 3 would reduce the area and road mileage for dispersed recreation, it would also provide the greatest potential to expand the trail system and increase public access and dispersed recreation opportunities along trails. Currently there are approximately 160 miles of trail, 12 developed trailheads with parking and restrooms, and 10 small trailheads with limited parking and no restrooms. Trail development opportunities could increase the trail mileage by 18 to 20 miles, and about 10 miles of existing trails could be reconstructed to add bridges, retaining walls and switchbacks. In addition, some old roads could be converted to trails. Approximately 150 miles roads might be decommissioned. Those roads would be evaluated for conversion from roads to trails. Potential expansions would also include two new trailheads and four trailhead expansions that would increase parking and trail access. Approximately 0.3 miles of new road would be constructed in the development of new trailheads. The combined increase in trail mileage, trailheads, and parking could be from 25 to 100% of current availability. The impacts of increased trail use on natural resources are unknown.

In addition to the more detailed recreation development opportunities discussed above, other areas of emphasis for possible future recreation development are identified below.

Emphasis in the northern portion of the Monument would include loop trails that join Princess Campground with features within the giant sequoia groves in the Indian Basin/Converse/Cherry Gap ROA (see Figure II-3). Signs and other educational opportunities would be available at places like Stump Meadow, Chicago Stump, and the Boole Tree, and along remnant features from the railroad-logging era. In the southern portion of the Monument, potential trail improvement and construction projects would include those at the Needles/Dome Rock ROA, those that join the Monument with Mountain Home State Demonstration Forest in the Camp Wishon ROA, those in the Camp Nelson ROA, and ones that would join the Deer Creek Grove and the with Frog Meadow Campground in the Deer Creek ROA. Among other trail possibilities are a loop system tied in with the Poso Cabin and the Sandy Creek Fire Road in the Poso-Panorama ROA, as well as one that would provide access into Slate Mountain to the west of the Needles/Dome Rock ROA (see Figure II-3 in the Map Packet).

Winter use would be encouraged with an emphasis on non-mechanized activities such as snow play, cross-country skiing, and snowshoeing. Winter parking areas would continue to be maintained at current locations. No new winter recreation trails or snow park areas are currently under consideration or are reasonably foreseeable, and winter use would not be expected to increase significantly. Snowmobile use would be eliminated and snow grooming on roads would no longer be provided.

f) Alternative 4

The management direction in Alternative 4 would encourage increasing recreation opportunities by relocating and expanding existing facilities and concentrating recreation facilities in the Human Influence Zone Management Area (see Figure II-6 in the Map Packet). This alternative would place less emphasis on developing new recreation facilities than Alternatives 2, 5, 6, and Modified 6. In order to increase capacity for recreation, some existing campgrounds, picnic areas, interpretive sites, and trails would need to be expanded and maintained.

This alternative would encourage expansion of single-family campgrounds, group campgrounds, picnic areas, trails and trailheads, interpretive sites, and other appropriate recreation facilities and opportunities. Expansion of these types of facilities would increase the capacity of recreation facilities and opportunities for the public in the Monument. Development opportunities listed below (and shown on Figure II-3 in the Map Packet) are based on estimates provided by recreation managers within the Monument. Development of any of these proposed facilities would require a site-specific project analysis before any additions or changes could occur.

As new facilities are expanded or developed, costs for development and maintenance of recreation facilities would increase. The ability of this alternative to increase recreation facility capacity would depend partially on the level of funding available.

Potential Recreation Development	Change in Capacity
Single Family Campgrounds Stony Creek expansion, Hume Lake upgrade, Big Meadow relocation and expansion, Buck Rock expansion, Tenmile expansion, Upper Peppermint relocation and expansion, Wishon relocation and expansion, Lower Peppermint relocation and expansion.	Expansions at these facilities could increase capacity by up to 75% for overnight camping.
Group Campgrounds Holey Meadow reconstruction and expansion, Long Meadow reconstruction and expansion.	Development or expansion of these facilities could increase capacity by up to 7%.
Picnic Sites Big Meadow winter trailhead development, Cherry Gap development, Dome Rock development.	Development of these facilities could increase capacity by up to 30%.
Interpretive and Education Sites Wishon Interpretive Trail upgrade, Needles Trail upgrade, Hume Lake museum and amphitheater development, Converse Basin interpretive trail and amphitheater, Trail of 100 Giants upgrade.	Development or upgrades at these facilities could increase capacity by up to 45%.
Trails and Trailheads Stony Creek trail reconstruction, Marvin Pass trailhead improvement, Horse Corral parking expansion, Converse Basin trailhead	Development or reconstruction of these trail facilities and conversion of closed roads to trails could increase capacity by up to 25%.

development, Camp Nelson trail reconstruction and development, Deer and Capinero trail reconstruction, Western Divide and Lloyd Meadow Corridors trail development, Needles vista and climber trailhead development.	
Road Access for Dispersed Recreation Approximately 875 miles available for pubic use.	<5% reduction in dispersed recreation accessed by roads.

(1) Overnight Camping and Picnic Sites

Expansion of single-family campgrounds, group campgrounds, and picnic sites would have the potential to increase capacity for these types of facilities by about 60%, from 3225 People At One Time (PAOT) to 5225 PAOT. This level of expansion would require development equal to all of the identified recreation development opportunities listed above. The actual level of expansion would depend on public demand, funding, and site-specific analysis for each project.

New roads to provide access to these facilities would be estimated to add approximately 1.2 miles to the existing road system. In addition to the access roads, new interior roads to reach campsites and parking spurs within these facilities would be estimated to add from 3.0 to 4.9 miles of road to the existing road system. These new facilities would occupy approximately 160 acres of land (.05% of the Monument).

To the extent that new facilities are developed, there might be less crowding for visitors and fewer days when campground occupancy rates exceed 60% (the point at which many people feel crowded). Traffic would increase on access roads, as would visitation in general. Impacts to natural resources and public safety due to increased traffic and visitation are unknown.

(2) Interpretation and Education.

Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%, if all the identified recreation developments are built. The actual capacity of interpretive sites is unknown. This estimate is based on the number of existing interpretive sites (11) compared to the number of potential new sites identified by recreation managers (5).

To the extent that new interpretive facilities are developed, more people would have access to interpretive and educational information regarding the Monument. This would lead to an increase in awareness of the Monument and its natural and human history. The interpretive development opportunities would include additional trails that provide access for people with disabilities.

Approximately 8 to 12 acres would be converted from undeveloped forestland to interpretive sites if all the identified interpretive developments are built (.004% of the Monument).

Traffic would likely increase on roads that provide access to interpretive sites. Impacts to natural resources and public safety due to increased traffic and visitation are unknown.

(3) Dispersed Recreation.

Lands and roads within the Monument would be open for dispersed recreation use in Alternatives 4, with some exceptions. For example, no dispersed camping would be allowed within developed campgrounds, administrative sites (ranger stations, work centers), or resorts; no off-highway vehicle or snowmobile use would be allowed off of designated roads, and no bicycle use would be allowed off of designated trails or in wilderness areas.

In this alternative, dispersed use would provide the opportunity for the public to use and explore lands in the Monument in a natural-appearing environment, with little evidence of the sights and sounds of human activity. For example, the opportunity to select a suitable location for a primitive camping experience, without having to camp in a developed campground or pay a fee, would remain an option for Monument visitors. This would provide an opportunity that does not exist in many county, state, and national parks. The added challenges and risks associated with dispersed recreation would be available.

Alternative 4 would encourage dispersed recreation by retaining road access at levels similar to the current road system (approximately 875 miles of the 900 mile designated road system). Most roads would be open for public access, allowing visitors to recreate in areas that are not part of a developed facility. Visitors would be free to camp, picnic, explore, hike, and participate in many other outdoor activities in a natural-appearing setting. Approximately 615 miles of the designated road system would be available for riding OHVs. Snow grooming on roads for snowmobiling, cross-country skiing, and snowshoeing would continue if funding from the California Off-Highway Vehicle Program is available. Currently there are approximately 135 miles of road in the Monument that are groomed for winter use, depending on snow conditions. There would be a small reduction in the capacity for dispersed recreation that is accessed by automobile along the road system, estimated to be less than 5%. The small mileage of new roads that may result from developing new campgrounds, administrative sites, or for research needs would not add to the areas available for dispersed recreation that are accessible by automobile.

Expansion of the trail system would increase public access and dispersed recreation opportunities along trails. Opportunities to restore historic trails that have been lost or obliterated by roads would be evaluated. Currently there are approximately 160 miles of trail, 12 developed trailheads with parking and restrooms, and 10 small trailheads with limited parking and no restrooms. Trail development opportunities could increase the trail mileage by 18 to 20 miles. In addition, some old roads could be converted to trails. Approximately 25 miles or roads would be decommissioned. Those roads would be evaluated for

conversion from roads to trails. About 10 miles of existing trails could be reconstructed to add bridges, retaining walls, and switchbacks. Potential expansions would include two new trailheads and four trailhead expansions that would increase parking and trail access. Approximately 0.3 miles of new road would be constructed for the development of new trailheads. The combined increase in trail mileage, trailheads, and parking could be up to 25% of current availability. The impacts of increased trail use on natural resources are unknown.

In addition to the more detailed recreation development opportunities discussed above, other areas of emphasis for possible future recreation development are identified below.

In the northern portion of the Monument, emphasis would be given to dispersed activities and camping with few amenities at recreation opportunity areas in the Millwood ROA, the Buck Rock ROA, and the Rowell/Horse Corral ROA. Highway 180 and the Generals Highway would receive priority for sightseeing, wildlife viewing, and nature interpretation (see Figure II-3). Winter dispersed use for snow play, snowmobiling, and cross-country skiing would be emphasized along the Generals Highway, in the Big Meadows ROA, and in the vicinity of the Indian Basin/Converse/Cherry Gap ROA (see Figure II-3 in the Map Packet). New winter recreation routes and/or parking facilities in association with the Hume Lake Historic Area would be evaluated for development. New winter access would emphasize opportunities for non-motorized recreation.

In the southern portion of the Monument, emphasis for dispersed recreation opportunities would be placed on the Camp Wishon ROA to include trail opportunities to join with Mountain Home State Forest, and to reach the Needles/Dome Rock ROA from the Western Divide Highway. Opportunities for wildlife viewing, camping with few amenities, and trails would be a focus along the Lloyd Meadows Road Corridor. Parking facilities for winter recreation would be evaluated for improvement and expansion at the Sugarloaf winter trailhead, at the intersection of the North Road with Highway 190 in the Freeman Creek/Quaking Aspen ROA, and in the Needles/Dome Rock ROA. New winter access would emphasize opportunities for non-motorized recreation.

3. Scenic Environment

a) Alternative 1

This alternative would retain the visual quality objectives assigned by the Forest Plan, although they would be converted to scenic integrity objectives used in the Scenery Management System. For the Monument, they consist of approximately 9% (29,400 acres) of very high, 13% (42,400 acres) of high, 32.5% (106,100 acres) of moderate, 38% (124, 000 acres) of low, and 7.5% (24,500 acres) of very low.

b) All Action Alternatives

With the creation of the Monument, the natural beauty of the land gained greater significance as a national treasure. The scenic resource is an integral part of landscape management in all alternatives. The Scenic Integrity Objectives (SIOs) for all alternatives are approximately 18% (60,200 acres) of very high, 28% (91,200 acres) of high, 53.5% (174,200 acres) of moderate, and 0.5% (800 acres) of low.

Since the goal of all action alternatives is to reach the same scenic integrity objectives throughout the Monument, techniques to help meet these objectives are discussed. Fuel management techniques are proposed in varying degrees and offer the greatest potential for distractions to scenic quality. A paper titled, “Vegetative Management through Fuel Treatment and the Scenery Management System” is included in part and provides guidance to meet the objectives.

The management of vegetation, and its residues, is a critical element of ecosystem management. One result of the continual quest to improve the techniques of managing vegetation is the Scenery Management System. Through this system, the relative importance of aesthetics has been identified and quantified on all national forest system lands.

Very high and high scenic integrity objectives have been assigned to the landscapes of highest visual sensitivity. Distances up to ¼ mile from the observer are the most critical zones. Managing these lands to retain the dominance of a natural landscape is the objective.

The dilemma is that many conifer stands are in an unnaturally dense state, or contain ground fuels or "ladder fuels" that create an extremely high fire hazard. A similar situation is found in the chaparral where the shrubs are decadent and highly flammable. The challenge, then, is to treat the fuels and reduce the fire danger within the very high, high, and moderate zones without management activities appearing to be the dominant element. Fuels treatment projects should be planned, designed, and implemented incorporating the Scenery Management System.

The selective removal of trees and prescribed burning (of vegetative residues and related flammable materials) can have a positive effect on the scenic values of the national forest. Plantings of more fire-resistant species, such as ponderosa and Jeffrey pines, giant sequoia, and incense cedar, in fire-prone areas can have a similarly positive effect. The potential positive effects of fuels treatment by selective removal of vegetation and prescribed burning are:

- Increased visual penetration into the forest
- Opening vistas that allow views of spectacular forest scenes
- Allowing fresh exposures to scenes previously covered by dense understory

- Rejuvenating decadent, over-mature shrubs, with resulting new growth and bright new colors
- Giving a "park-like" appearance to the forest floor
- Reducing the likelihood of a major wildfire
- Creating a mosaic of different plant species, age classes, or successional stages
- Resulting in greater numbers of large trees and lesser numbers of small and medium-sized trees (but still a mix)

The potential negative effects of fuels treatment by selective timber removal and prescribed burning are:

- Removal of gnarled, entwined snags that make picturesque, even grotesque, shapes for scenic views and photographs
- Scorched tree crowns, blackened tree trunks, dead understory vegetation, and a blackened forest floor
- Stumps and disturbed soils
- Loss of a sequence of views and frames for vistas by losing understory, regeneration, and intertwining crowns
- Short-term loss of low ground covers

Public information that addresses the temporary nature of adverse effects to scenery associated with prescribed burning can help to reduce the potential for negative public reaction after a fuels treatment project.

4. Socio-Economics

In assessing socio-economic effects of the alternatives, the selected indicator is the number of jobs for the three county area comprising Fresno, Tulare, and Kern Counties. Potential effects on the service and retail sectors are aggregated to the three-county area because there is no information regarding the location of recreation visitation over the next ten years. In contrast, change in the manufacturing sector, due to change in the availability of wood products, is assumed to be in Tulare County. There is only one industrially scaled lumber mill in the three-county region that bids on timber from the Sequoia National Forest timber and it is located in Tulare County.

a) Visitation: The Service and Retail Sectors

All Alternatives. Over the next ten years, visitation to the Monument is expected to increase from 6.5 million visits to 7.5 million visits under all alternatives except Alternative 3. For the latter, visitation is expected to rise to 6.9 million visits, or about 8% fewer visits than is projected for the other alternatives. The difference would be

largely due to the closure to public use of about 400 miles of road and a simultaneous reduction in dispersed camping and other dispersed recreation activities throughout the Monument.

Because the volume of visitation is expected to increase gradually over ten years by the same 1,000,000 visits per year for all alternatives except Alternative 3, activities proposed for the Monument would have no effect on visitation. Thus there is no projected effect on the tourist-related employment in the service and retail sectors. In contrast, since Alternative 3 would produce a lower projected rate of growth in visitation over the next ten years, one of two things could happen in the service and retail sectors of the three affected counties. Either demand for goods and services could rise in relation to the other alternatives because visitors, who might have camped, now seek motel rooms and restaurant meals, or demand could fall relatively, as the overall volume of visitation increases at a slower rate. If Alternative 3 is selected, visitation and demand for services could be monitored to determine the actual economic effect.

b) Ecosystem Management: The Forestry/Agriculture and Manufacturing Sectors

All Alternatives. Ecosystem management in the Monument would be accomplished through prescribed burning and mechanical treatments (e.g., brush crushing, chipping, etc.). While Forest Service crews would accomplish the burning, harvesting and mechanical treatments would typically be done by contract with private companies. The availability of wood products under any alternative would be completely dependent upon site-specific project analyses and finding that tree removal is clearly needed for ecological restoration or public safety.

Acres of mechanical treatment would vary from approximately 330 acres per year in Alternative 4 to about 4,050 acres per year in Modified Alternative 6. Within the context of the enormous agriculture sector in Fresno, Tulare, and Kern Counties, these additions would be negligible and no effect on future employment would be expected.

Employment in logging and milling, in the manufacturing sector, would be a somewhat different matter. Table IV-20 shows the potential timber harvest and the number of jobs supported incidental to ecosystem management.

Table IV-20: Timber Harvest and Jobs Supported in the First Decade

Alternative	Potential Volume Available per Year (Million Cubic Feet/Million Board Feet)	Jobs/Year[1]
1	1.0/5.0	25-30
2	1.0/5.0	25-30
3	0.2/1.0	8-10
4	0/0	0
5	1.0/5.0	25-30
6	2.1/10.5	50-55
Mod 6	1.5/7.5	40-45

[1]Estimated based on less than or equal to 30 jobs per million cubic feet in woods and mill.

The volume of wood products removed would range from about 0.2 MMCF per year in Alternative 3 to approximately 2.1 MMCF per year in Alternative 6. Alternative 4 would produce no commercial harvest at all. Therefore, Alternative 4 would not support any jobs in the manufacturing sector through commercial logging or milling. The other action alternatives would support from eight to ten jobs under Alternative 3 to as many as 50 to 55 jobs under Alternative 6. Because Alternative 1, the no action alternative, supports 25-30 jobs, the effect of Alternative 3 would be the loss of support for 17 to 20 jobs, while that of Alternative 6 could be the addition of 25 manufacturing jobs in Tulare County. While these jobs are small in number, they are important because they might make the difference between continued operation and closure of the one mill that exists in the local area.

c) Social Values Regarding Vegetation Treatments

A social effect is a change in social and cultural conditions that directly or indirectly results from actions taken by the Forest Service. Social impact analyses identify potential public needs, concerns, and values that resource managers must consider in decision-making. These needs, concerns, and values also inform decision makers and the public of potential social effects that might occur as a result of Forest Service actions. This analysis focuses on which alternatives redeem which sets of values regarding forest management.

For purposes of this analysis, the central difference in values pertains to the means and methods of forest management expressed by various members of the public. The overall goal of attaining the desired conditions for historic stand structure, historic fire regimes, and protecting the objects of interest, especially giant sequoias, is widely agreed to. The debate arises from the various methods to achieve that goal. The issue centers on what types of management activities, including logging, mechanical vegetation treatments, or prescribed fire, are appropriate for use within lands designated as the Giant Sequoia National

Monument. It considers how application of the prescribed management activities is or is not consistent with expectations, values, and beliefs of different individuals.

Addressing this issue requires the full range of alternatives since different people support a range of values regarding approach to forest management. Some want more active mechanical treatments to maintain and restore resources in the Monument while others want fire alone to make up for man's intervention for the past 100 years. Some believe the cost of forest management should be at least partially offset by the sale of forest products, e.g. timber, while others do not. Accordingly, the indicators of change responsive to this diversity of opinion are the cubic foot volume of wood products that would be available from protection and restoration treatments and the number of acres for which mechanical treatment would be prescribed per year. Note that none of this volume would be produced as part of an industrial wood program. It is an estimate of the volume that might be produced incidental to the protection and restoration activities designed to achieve the desired conditions.

Table IV-21: Indicators of Social Values Regarding Forest Management, First Decade

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Mod 6
Volume of Wood Products Potentially Available from Protection and Restoration Treatments (MMCF*/MMBF** per decade)	10/50	10/50	2/10	0	10/50	21/105	15/75
Acres Of Mechanical Treatments Per Decade (acres/decade)	21,050	19,500	5,600	3,300	38,100	35,100	40,500
Ranking: Prefer Fire Alone & No Production	3	3	2	1	4	5	6
Ranking: Prefer Mechanical Treatment and Production	4	4	5	6	3	1	2

*Million Cubic Feet
**Million Board Feet

Since most of the controversy in values focuses on the amount of mechanical treatment versus prescribed fire, and on whether any timber volume is produced as a result, Table IV-21 ranks all alternatives accordingly. Values are redeemed approximately according to the two rankings.

Those who prefer fire, without timber production as a management tool, would tend to favor Alternatives 3 and 4. These show the lowest number of acres treated mechanically and the lowest volume or no timber by-product. Alternative 4 would be ranked first because it shows the fewest acres treated mechanically and no timber by-product. Because Alternatives 1 and 2 are virtually identical and treat the next fewer number of acres mechanically, they are given the same third ranking.

Alternative 5 would be the fourth choice because it more than doubles the acres treated and enters the groves for a minor amount of mechanical treatment to create the openings requisite for giant sequoia reproduction. Alternatives 6 and Modified 6 would place fifth as they both show substantial increases in the amount of mechanical treatment, the acres of gaps created, and the volume produced. More mechanical treatments are shown for Modified Alternative 6 than Alternative 6, but this is primarily due to the emphasis on the restoration of existing plantations, where mechanical treatments are considered to be more acceptable.

Those who value active mechanical treatment and incidental production of timber to help defray the costs of restoration would rank the alternatives nearly in the reverse order. Alternative 6 would be ranked first, while Modified Alternative 6 would be ranked second. Alternative 5, for similar reasons, would be ranked third. Alternatives 1 and 2, virtually identical, would both be ranked fourth. Alternative 3 would rank fifth by virtue of some incidental timber production and Alternative 4 would probably rank sixth.

D. Transportation

1. Roads

a) All Alternatives

In all of the alternatives, the road system would be managed to reduce safety hazards to road users and reduce unacceptable resource impacts from roads. The highest priority for road maintenance would be the Maintenance Level 3 through 5 roads for public access and reasonable access to private property. Other roads that provide access to private lands, important fire protection features, administrative sites, special use permitted areas, and developed recreation areas would also be priorities to maintain (see Figure II-3 and Appendix E maps for displays of the Monument road system).

The existing maintenance funding is not enough to fully maintain the existing roads within the Monument. The lack of maintenance, particularly on the lower priority Maintenance Level 1 and 2 roads, is causing deterioration of the roadways. Some roads have become overgrown with brush and trees and are impassable to vehicular traffic. Other roads are causing resource damage in the form of sedimentation, as culverts and other drainage structures no longer function properly.

In the past five years, funding was sufficient to partially maintain 28% of the road system within the Monument. The current funding is used to repair the most pressing safety-related road problems. As a result, few of the roads are being maintained to standard or within the 20-year maintenance cycle. Certain maintenance-related items are deferred to a later time, and some capital improvements are not accomplished. At this rate, the Monument road system would

inevitably be affected, and, ultimately, only the Maintenance Level 3 to 5 roads would remain for public and administrative access (see Appendix E maps).

Direction for the past decade has been to encourage road decommissioning, in part to address the deferred maintenance issue. Funding has been available to decommission three to six miles of road annually within the Monument. Over the past five years, roads have been selected to decommission that are causing resource damage or are overgrown and becoming impassable to vehicle traffic. Road decommissioning, especially unclassified roads, is expected to continue under any of the alternatives.

b) Alternatives 1, 2, 5, 6, and Modified 6

The road system under Alternatives 1, 2, 5, 6 and Modified 6 would be comprised of approximately 900 miles of roads within the Monument. Not all of the mileage is open to public vehicular traffic. Currently, 360 miles are classified as Maintenance Level 1 roads, which are technically closed to vehicular traffic. However, many of these roads in the Monument do not have physical barriers that prevent public use. The expectation is that the majority of roads would continue to be used for public access, as well as resource management activities.

Retaining the road system mileage similar to current levels would provide the highest levels of access for dispersed recreation opportunities, as well as ecological restoration and fire protection treatment areas, compared to Alternatives 3 and 4.

Alternatives 1, 2, 5, 6, and Modified 6 would have the highest costs for maintaining the road system. The maintenance strategy in these alternatives would require the greatest increase in funding (approximately 35%) to keep the road system in acceptable condition.

If the funding is not adequate to keep the road system in acceptable condition, roads would be repaired, closed, relocated, or decommissioned to reduce impacts. A lack of funding for maintenance could lead to a reduced available road mileage as roads are closed or decommissioned. If maintenance funding is adequate to prevent unacceptable impacts, but is not adequate for full maintenance, the overall condition of the road system could be lower for these alternatives than for Alternatives 3 and 4.

Alternatives 1, 2, 5, 6, and Modified 6 have the lowest potential for converting roads to trails.

The transportation plans for Alternatives 1, 2, 5, 6, and Modified 6 are found in Appendix F.

c) Alternative 3

The road system under Alternative 3 would be comprised of approximately 755 miles of roads. Not all of the mileage is open to public vehicular traffic, as some is classified as Maintenance Level 1 roads, which is technically closed to vehicular traffic. However, many of these roads in the Monument do not have physical barriers that prevent public use. The expectation is that most of the roads would be used for resource management activities, and a portion of the road system would be available for public access, as well.

Reducing the road mileage by decommissioning and closing roads to public vehicular access would provide the lowest level of access for dispersed recreation opportunities, as well as restoration and protection treatment areas, compared to the other alternatives.

Roads proposed for decommissioning would generally be short roads, less than one mile, with moderate to high risk for producing unacceptable resource impacts, and do not provide access to recreation sites, high profile groves, special use permitted areas, or private land.

Alternative 3 would have the lowest costs for maintaining the road system, due to a reduction in the total miles of road from 900 to approximately 755, and by closing approximately 240 miles of road to public vehicular access. This alternative would require the least increase in funding (approximately 12%) to keep the road system in acceptable condition. This assumes the roads that are decommissioned and closed are an equal mix of low standard, Maintenance Level 1 and 2 roads. The reduction in maintenance costs would begin after roads are decommissioned and after closed roads have gates or barriers installed. The cost to decommission roads would be approximately $1,800,000.

Reducing the total road mileage should reduce the maintenance costs in the long run more than the other alternatives.

Alternative 3 would have the highest potential for converting roads to trails through decommissioning (estimated 145 miles of road for decommissioning), as roads are evaluated for recreational trail use.

The transportation plan for Alternative 3 is found in Appendix F.

d) Alternative 4

The road system under Alternative 4 would be comprised of approximately 875 miles of roads within the Monument. Not all of the mileage is open to public vehicular traffic, as some is classified as Maintenance Level 1 roads, which is technically closed to vehicular traffic. However, many of these roads in the Monument do not have physical barriers that prevent public use. The expectation is

that most of the roads would be used for resource management activities and would be available for public access, as well.

Reducing the road mileage by decommissioning approximately 25 miles of road would provide a small reduction in the level of access for dispersed recreation opportunities, as well as restoration and protection treatment areas, compared to Alternatives 1, 2, 5, and 6. This alternative would provide more vehicle access than Alternative 3.

Roads proposed for decommissioning would generally be short roads, less than one mile, with high risk for producing unacceptable resource impacts, and do not provide access to recreation sites, special use permitted areas, or private land.

Alternative 4 would have lower costs for maintaining the road system than Alternatives 1, 2, 5, and 6, due to a reduction in the total miles of road from 900 to approximately 875. It would require an increase in funding (approximately 34%) to keep the road system in acceptable condition. This assumes the roads that are decommissioned are low standard, Maintenance Level 1 roads. The reduction in maintenance costs would begin after roads are decommissioned. The cost to decommission roads would be approximately $312,500.

If funding is not adequate to keep the road system in acceptable condition, roads would be repaired, closed, relocated, or decommissioned to reduce impacts. A lack of funding for maintenance could lead to a reduced available road mileage as roads are closed or decommissioned. If maintenance funding is adequate to prevent unacceptable impacts, but is not adequate for full maintenance, the overall condition of the road system could be lower for this alternative than for Alternative 3, but somewhat better than in Alternatives 1, 2, 5, and 6.

Alternative 4 would have a lower potential for converting roads to trails than Alternative 3, due to fewer miles of road being proposed for decommissioning (estimated 25 miles of road for decommissioning) that could be considered for recreational trail use.

The transportation plan for Alternative 4 is found in Appendix F.

E. Other Effects

The following described effects have not yet been discussed in this FEIS, as required by 40 CFR 1502.16.

Other related efforts that might affect the Proposed Action as presented in this document include the review of the Framework decision.

Upon completion of his review of Framework appeals, the Chief of the Forest Service affirmed the decision to implement the Framework. The Chief directed the Regional

Forester to review three elements of the Framework, along with other concerns raised in the appeals. The Review Team will evaluate any needed changes to the Framework Record of Decision (ROD) relative to:

- Framework fuel treatments,
- Consistency of the Framework with the National Fire Plan, and
- Compatibility of the Framework with the HFQLG Forest Recovery Act (Sierra Nevada Framework Plan Amendment Review Team Charter, Blackwell, 3/1/2002).

The Framework Supplemental EIS (SEIS) will consider all portions of the ROD. Upon completion of the Framework SEIS, the Monument Management Plan will then be reviewed to determine consistency with the results of the Framework SEIS (40 CFR 1502.16(c)).

Other foreseeable actions that might affect this decision include the revision of the Forest Plan. A revised Forest Plan could modify or amend the resulting decision. The Forest Plan revision is scheduled to begin following completion of the Monument Management Plan.

Throughout the planning process, officials from the Sequoia National Forest have been in consultation with the Tribal Council of the Tule River Indian Reservation. The Monument management plan makes allowances to avoid any possible conflicts between Tribal land use plans and the management of the Monument (40 CFR 1502.16(c)).

No other possible conflicts between federal, regional, state, local, or Indian reservation land use plans, policies, and controls for the area are anticipated at this time (40 CFR 1502.16(c)).

None of the alternatives have expected energy requirements and conservation potential (40 CFR 1502.16(e)).

None of the alternatives would affect the design of the built environment (40 CFR 1502.16(g)). The effects of implementing the alternatives on urban quality, and historic and cultural resources are displayed in the Air Quality and Heritage Resources sections of Chapter IV.

Means to mitigate adverse environmental impacts are considered in the alternatives. No separate mitigations were considered (40 CFR 1502.16(h)).

F.Unavoidable Adverse Effects

Implementation of the alternatives would result in some unavoidable adverse effects. The alternatives were designed to move resources toward desired conditions but, to accomplish those goals, some unavoidable adverse effects would result. These effects would vary by resource.

Implementation of any of the alternatives, including Alternative 1 the no action alternative, would result in smoke emissions from prescribed burning. Emissions would vary in amount by number of acres burned. The more acres proposed for prescribed burning would result in lower emissions from wildfires, which generally result in greater emissions per acre and commonly exceed ambient air quality standards. For further information, refer to the Air Quality section in Chapter IV, Emissions From National Monument Activities.

During prescribed burning, which is considered in all the alternatives, some trees would be killed. The amount of mortality would vary by fuel loading and topography. Mortality estimates result from fire behavior modeling and past experience. For more detailed information regarding the outcomes of the analysis, refer to Fire and Fuels in Chapter IV.

Inventories of archeological findings are required by the National Historic Preservation Act (Section 800). Still, there exists a potential for undiscovered sites to be exposed and/or damaged by surface disturbance or other events. If sites are found prior to implementation, mitigation to provide protection would be applied. However, often the sites are found too late. This potential damage represents an unavoidable adverse effect, present in all alternatives. A detailed description can be found in Chapter IV, Heritage Resources, All Alternatives.

G. Relationship Between Short-Term Uses and Long-Term Productivity

The consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16) is required by NEPA. This includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generation of Americans (NEPA, Section 101). Discussion related to short-tem uses and long-term productivity can be found in detail in Chapter IV under individual resource discussions.

Alternatives 1, 2, 5, and 6 would implement ground-disturbing activities that would produce the greatest amount of short-term effects to soil and water quality while providing the greatest long-term benefits in terms of prevention of and protection from wildfire.

Alternatives 3 and 4 would implement some road closures and road decommissioning. Alternative 3 proposes a net reduction of approximately 250 miles that would change use patterns due to the loss of the roads for public use. In addition, roads that are proposed for decommissioning would require ground-disturbing work to remove the roadbed and replace the natural topography, if that decommissioning method is used. This work would have short-term detrimental effects but would be beneficial to the ecosystems over the long term.

Similar findings would be true under Alternative 3, when dispersed recreation areas not in compliance with the Framework aquatic management strategy are removed from use. To restore sites to their natural settings, some amount of ground disturbance would need to take place. The long-term benefits of the ground disturbance would outweigh the short-term impacts.

Alternatives 3 and 4 propose more prescribed fire over the landscape. Over the short-term, this action would produce more sediment from hotter fires. This, combined with road decommissioning, would produce more sediment in the short-term but would reduce sediment over the long term.

All potential disturbances would be evaluated and mitigated at a site-specific level prior to implementation through landscape analyses.

H. Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

All action alternatives would incorporate the recreation opportunity areas developed by forest recreation personnel. The potential projects included in the opportunity areas would involve some amount of new development and expansion. Areas would be compacted and hardened, resulting in a temporary loss of some resources in the Monument. Prior to implementation of any project, a site-specific analysis would be conducted to analyze the effects of the proposal. Mitigation of potential effects would be included in those proposals. Localized negative impacts on stand structure would occur as vegetation is permanently removed to allow for the development of access roads and structures.

The potential for irreversible commitments of heritage resources exists in all the alternatives. Examples include inadvertently damaged or destroyed sites, vandalized or looted sites, and sites that have not been inventoried and recorded and are undergoing loss from natural processes. To ensure that losses of this type are kept to an absolute minimum, each alternative proposes inventory and evaluation, monitoring, and improved project implementation. A full description can be found in Chapter IV, Heritage Resources, All Alternatives.

I. Disclosures

The National Environmental Policy Act directs that “to the fullest extent possible, agencies shall prepare draft EIS’s concurrently with and integrated with…other environmental review laws and executive orders” (40 CFR 1502.25(a)).

The Presidential Proclamation of April 15, 2000 directed the Secretary of Agriculture through the Forest Service to consult with the Secretary of the Interior, through the Bureau of Land Management and the National Park Service. The Forest Service has been in contact and consultation with natural resource managers, particularly giant sequoia specialists, from Sequoia and Kings Canyon National Parks, the Bureau of Land Management, the Tule River Indian Tribe, the California Department of Forestry and Fire Protection, and educators from the California Polytechnic University at San Luis Obispo and the University of California at Berkeley.

In accordance with the Endangered Species Act, the Monument planning team has consulted with the U.S. Fish and Wildlife Service throughout the development of the FEIS. Several meetings were held between the Monument planning team and U.S. Fish and Wildlife Service employees in Sacramento, California. The FEIS was also sent to officials of the U.S. Fish and Wildlife Service for their review and comments.

Ongoing consultation with local Tribal governments and Native Americans has occurred throughout the development of the FEIS. Several meetings with the Tule River Indian Tribal Council, the Sequoia National Forest Supervisor, and members of the Monument planning team are documented in the project file. An employee of the Tule River Tribe has worked closely with the Monument planning team throughout the process.

Consultation with the National Marine Fisheries Service is not required due to the absence of anadromous fish and their habitat.