

Summary

The Giant Sequoia National Monument (Monument) is located in south-central California and is administered by the United States Department of Agriculture (USDA), Forest Service, Sequoia National Forest (see Figure I-1, Vicinity Map). This 327,760-acre monument was established by Presidential Proclamation on April 15, 2000.

“The rich and varied landscape of the Giant Sequoia National Monument holds a diverse array of scientific and historic resources. Magnificent groves of towering giant sequoias, the world’s largest trees, are interspersed within a great belt of coniferous forest, jeweled with mountain meadows. Bold granitic domes, spires, and plunging gorges texture the landscape. The area’s elevation climbs from about 2,500 to 9,700 feet over a distance of only a few miles, capturing an extraordinary number of habitats within a relatively small area. This spectrum of ecosystems is home to a diverse array of plants and animals, many of which are rare or endemic to the southern Sierra Nevada. The monument embraces limestone caverns and holds unique paleontological resources documenting tens of thousands of years of ecosystem change. The monument also has many archaeological sites recording Native American occupation and adaptations to this complex landscape, and historic remnants of early Euro-American settlement as well as the commercial exploitation of the giant sequoias. The monument provides exemplary opportunities for biologists, geologists, paleontologists, archaeologists, and historians to study its objects (Appendix B: Proclamation, pages B-2 to B-3).”

“Giant sequoias are the largest trees ever to have lived, and are among the world’s longest-lived trees, reaching ages of more than 3,200 years...[They] hold within their tree rings multi-millennial records of past environmental changes such as climate, fire regimes, and consequent forest response (Appendix B: Proclamation, page B-3).” The establishment of the Monument offers an unparalleled opportunity for management of these international treasures.

The Monument Final Environmental Impact Statement (FEIS) presents seven alternatives designed to manage the giant sequoias and other objects of interest. The management plan for the Monument will consist of one of a selected alternative that establishes management direction for the land and resources within the Monument. It will amend the current Sequoia National Forest Land and Resource Management Plan (Forest Plan), as previously amended by the Sierra Nevada Forest Plan Amendment (Framework).

I. Purpose of and Need for Action

The Presidential Proclamation requires the preparation of a management plan for the Monument. The purpose of this management plan is to establish management direction for the land and resources within the Monument. It will amend the current Sequoia National Forest Land and Resource Management Plan (Forest Plan), as amended by the Sierra Nevada Forest Plan Amendment (Framework).

The Proclamation identified two critical problems facing the giant sequoias and their ecosystems: 1) an unprecedented failure in giant sequoia reproduction, and 2) an unprecedented buildup of woody debris and surface fuels, leading to an increased hazard from wildfires of a severity that was rarely encountered in pre-Euro-American times.

The Proclamation also clearly identifies opportunities for scientific research, interpretation, and recreation, as well as the need for a transportation plan. There is a need to develop management direction for the proper care and management of the objects of interest in the Monument. The objects of interest are:

- The naturally occurring groves of giant sequoia (see Figure I-2, Giant Sequoia Groves), described in the Proclamation as “Magnificent groves of towering giant sequoias, the world's largest trees...”
- The ecosystems within the Monument that surround the groves and provide enriching recreational and social experiences, outstanding landscapes, and an array of rare and endemic species, such as the fisher, the great gray owl, the American marten, the northern goshawk, the peregrine falcon, the spotted owl, and the condor
- The historical landscape in and around the Hume Lake Basin associated with the Euro-American use of the giant sequoias since the late 1800s
- The limestone caverns and prehistoric archeological sites that provide a paleontological record of the ecological changes that giant sequoias have undergone, as well as a prehistoric record of the relationship of the area to the native tribes

The management direction for the Monument will address the need for action, the desired conditions, and the significant issues generated by the proposed action.

A. Proposed Action

The proposed action was published in a Notice of Intent in the Federal Register and in the scoping letter, both dated June 8, 2001. It recommends the establishment of new or modified desired conditions and management goals for key resources in the Monument. A full description of the proposed action can be found in the description of Alternative 2 in Chapter II of the FEIS, Alternatives Including the Proposed Action.

The term “proposed action” is not synonymous with another term used in environmental impact statements, “preferred alternative.” Both are summarized briefly later in this Summary.

B. Decision to be Made

The decision to be made is the selection of a plan for managing the Monument. The Responsible Official will decide whether to implement the proposed action, an alternative to the proposed action, or take no action at this time.

C. Scientific Advisory Board

A Scientific Advisory Board (Board) was created with the purpose of providing scientific guidance during the development of this initial monument management plan. The Board operated under a Department of Agriculture charter, which was signed August 31, 2000 and expires upon completion of the management plan. It consisted of eight members, representing a range of scientific disciplines including the physical, biological, and social sciences. Its members are:

- Chairperson, Dr. Paul Waggoner, Department of Forestry and Horticulture, Connecticut Agricultural Experiment Station
- Vice Chairperson, Professor Jeanne Clarke, University of Arizona
- Dr. Douglas Piirto, Professor, California Polytechnic University
- Dr. David M. Graber, Senior Science Advisor, National Park Service
- Dr. Karen Nissen, Anthropologist/Archaeologist
- Dr. Daniel Tormey, Principal, Environmental Consultant, Entrix, Inc.
- Dr. Nate Stephenson, Research Ecologist, U.S. Geological Society
- Dr. George Woodwell, Woods Hole Research Center

The Board provided advice to the Forest Service in the form of advisories. The advisories were reached by a consensus of the board members present who had participated in the discussion regarding the advisory. The Board met six times and provided 27 advisories to the Forest Service (see Appendix C for the complete text of these advisories). Board meetings were open to public attendance and were also open to public comment during the first 30 minutes of each meeting.

D. Public Involvement

The Notice of Intent was published in the Federal Register on June 8, 2001. A scoping letter was mailed to interested publics on the same date. Both the Notice of Intent and the scoping letter asked for public comment on the proposal from June 8, 2001 to July 24, 2001. Over 2,500 comments were received during the scoping period. Using comments from the public, tribal consultations, the Scientific Advisory Board, and other agencies and organizations, the interdisciplinary team developed a list of potential issues to address (see next section, Issues).

Three issues of the publication “Giant Sequoia National Monument Issues and Updates” were mailed from December 2000 to April 2002. A web site for public access was made available at www.r5.fs.fed.us/giant_sequoia/.

In January 2002, a letter was mailed to the public requesting participation and information for the Roads Analysis Process as a part of the Monument planning process (see Appendix E). Opportunities to meet with the team leader were offered as part of the input process and were scheduled with two groups in February 2002.

Public meetings were held in Porterville on March 11, 2002 and in Bakersfield on March 12, 2002 to provide information on the development of alternatives for managing the Monument, answer questions, and encourage public involvement.

The Draft Environmental Impact Statement (DEIS) was released for public comment on December 2, 2002. The full DEIS was available for review in hard copy, on compact disc (CD), and on our website (see above). Comments were requested in written form and an e-mail address was made available, linked to the website.

Public meetings were held in Porterville, Bakersfield, Los Angeles, and Fresno, California from February 10 to February 20, 2003. The purpose of these meetings was to review and discuss the DEIS. Question-and-answer sessions were held at the end of each of these meetings, and forms were available for submitting written comments on the DEIS.

The public comment period for the DEIS ended March 17, 2003. A total of 16,122 letters, postcards, public meeting forms, e-mails, and faxes containing comments were received from individuals; preservation and environmental groups; businesses; grazing permittees; county, state, and federal government entities; tribal governments; placed-based groups; special use permittees; wood products associations; academic institutions; and motorized and non-motorized recreational groups. For more information on the comments received on the DEIS, how they were analyzed, and their responses, please see Appendix A of this FEIS, Response to Comment.

E. The Desired Conditions

The desired conditions stated below are broad, overarching descriptions of conditions that are desirable for key resources or opportunities within the Monument. These statements describe a common vision, or desired future state to achieve, for each of these Monument resources. For a complete description, see Chapter 1 of the FEIS.

Giant Sequoia and the Surrounding Ecosystems: The desired condition is to allow natural processes and vegetative structural conditions to become re-established at levels that allow ecosystems in the Monument to be both stable and resilient to environmental change. The structural conditions, and timing, intensity, and frequency of processes that existed prior to 1875 will be used as reference conditions. This period exhibited a fire regime of frequent fire return intervals, which helped promote a highly diverse vegetation mosaic of age classes, tree sizes, and species composition, along with a low risk of large catastrophic fires. Disturbances in these ecosystems will have led to the re-establishment of young sequoias by creating gaps or openings in the forest canopy. Fire will be the primary disturbance in the mixed brush/chaparral, lower Westside hardwood, and conifer (which includes the giant sequoia groves) ecosystems. Other disturbances in these ecosystems, as well as the red fir ecosystem, will include insect and disease activity, drought, and extreme weather. Ecosystems will provide a wide variety of habitat for terrestrial wildlife and aquatic species.

Fire and Fuels: Fires will generally be low intensity and occur frequently across the landscape. Fuel treatments will increase the efficiency of firefighting efforts and reduce risks to firefighters, the public, facilities and structures, and natural resources. Fuel treatments will provide a buffer between developed areas and wildlands. Fuel conditions will allow for efficient and safe suppression of all wildland fire ignitions.

Wildlife Habitat: The habitat in the Monument will continue to contribute substantially to the long-term viability of habitat and wildlife species populations that depend upon old forest conditions. This area will support a core or reservoir subpopulation of fishers that could expand northward to re-establish connections with the west coast meta-population.

Dispersed and Developed Recreation: Visitors to the Monument will find a rich and varied range of recreational, educational, and social opportunities enhanced by giant sequoias and the natural resources of the surrounding ecosystems. Visitors to the Monument will have the opportunity to recreate in a variety of settings, from primitive to highly developed areas. Scenic opportunities will range from pristine landscapes to locations where management activities are apparent, helping visitors appreciate how healthy ecosystems function and how humans fit into them. Both self-guided and assisted interpretive services will be available to anyone wanting to learn about the human and natural history of the groves.

Historic and Prehistoric Resources: The historic and prehistoric resources of the Monument will be protected, studied, interpreted, and managed to maintain their cultural and scientific integrity and provide educational, cultural, and recreational opportunities to visitors. The cultural and spiritual values of the Monument will be protected, managed, and utilized for the benefit of local tribes, communities, and visitors.

Transportation System: The road and trail network will be commensurate with the level of management activities occurring in the Monument and will supply the transportation system needed for public use related to recreation, special uses, private land access, fire protection, as well as the enjoyment, proper care, and management of the objects of interest. Roads and trails needed to meet management goals will be maintained to provide safe use and limit impacts to aquatic and terrestrial habitats. Roads not needed to meet management goals will be decommissioned and stabilized.

Caves: The natural condition of caves within the Monument will be primarily preserved to maintain natural functions and protect the unique resources that depend on a cave environment for existence. Some caves will provide educational and recreational opportunities for visitors. The study of caves will provide scientific knowledge, especially regarding the paleontological and archaeological artifacts that may shed light on thousands of years of change within the giant sequoia groves, their surrounding ecosystems, and the prehistoric people who helped shape the ecosystem.

Scientific Study: Management of the resources in the Giant Sequoia National Monument will reflect an active on-site research program in close cooperation with other agencies and entities that share management responsibilities for giant sequoias, along with opportunities for meaningful public participation. On-going cooperation and joint research efforts with the scientific community and cooperating agencies will be trademarks of the Monument's commitment to adaptive management as we continue to learn and refine our approaches.

F. Issues

Comments received during the public involvement process revealed important issues or public concerns. The following significant issues were identified from scoping and were used to develop alternatives to the Proposed Action and to focus the analysis.

1. Air Quality

Prescribed burning may increase short-term smoke emissions and impact public health. The Monument will contribute smoke to the San Joaquin Valley Air Basin. Prescribed burning may decrease long-term emissions by reducing the quantity and intensity of wildfires. Mechanical treatments may also contribute minor amounts of emissions through increased dust production.

2. Fire and Fuels

There is great public interest in ensuring that the fire and fuel reduction strategies in the Framework are effective in their extent and magnitude for treating and protecting the Monument. Fire is a natural disturbance and a key process in a healthy, functioning ecosystem. Fire return intervals in the Monument have been altered through years of fire suppression. Missed fire return intervals have resulted in increased surface, ladder, and crown fuels.

3. Giant Sequoia

Under certain conditions, the current limitations on crown canopy reductions and tree diameter size removal may not provide adequate opportunities to meet the desired condition for the giant sequoias and their associated mixed conifer ecosystems. Re-establishing natural processes and structural conditions will allow giant sequoia and their mixed conifer ecosystems to be both stable and resilient to environmental change.

4. Mixed Conifer Restoration

Under certain conditions, the strategies and direction in the Framework may not provide adequate opportunities to meet the desired condition of a more natural fire regime and vegetative stands structure in the mixed conifer ecosystem that surrounds the giant sequoia groves. Re-establishing natural processes and

structural conditions will allow giant sequoia and their mixed conifer ecosystems to be both stable and resilient to environmental change. Fuels strategies in the Framework may not restore the ecosystem to the desired condition in the Monument.

5. Recreation

Proposed recreation, interpretation, and education opportunities within the Monument may not meet the demands of visitors, local communities, partners, local governments, tribal governments, or the business community. Changes in the level of development may be needed to meet public demand.

6. Social Values Regarding Vegetation Treatments

Management activities including logging, mechanical vegetation treatments, or prescribed fire may impact the expectations, values, and beliefs that some people have concerning what this national monument should be and by what means it should be managed. Reaching the desired conditions may be a goal widely agreed to, but some of the methods used to reach the goal may be unacceptable to some.

7. Watershed

The timing, amount, and intensity of management activities necessary to reduce catastrophic fires and achieve the desired conditions may have negative cumulative effects on watersheds, water quality, and beneficial uses. Effects may include accelerated erosion, sedimentation, increased nutrient loading, and decreased stream stability and aquatic habitat.

8. Wildlife

Proposed fuel reduction and ecological restoration treatments may adversely affect wildlife species that are dependent on late seral/old growth habitat by reducing the amount of that habitat.

II. Alternatives Including the Proposed Action

Alternatives to the Proposed Action were developed to address the Purpose and Need and the significant issues. The FEIS analyzes seven alternatives: a No Action alternative (Alternative 1), the Proposed Action (Alternative 2), and five other action alternatives. The significant issues developed during public involvement were addressed differently in each of the action alternatives. All alternatives, except the No Action alternative, propose new management direction for the Monument.

A. Management Direction Common to All Action Alternatives

The description of each action alternative, except Alternative 1 (No Action), begins with an introduction followed by four major strategies that are summarized for each alternative. The alternatives are addressed in more detail in Chapter II of the Monument FEIS. The four strategies addressed for each action alternative are:

Restoration. This strategy addresses the need to restore key terrestrial and hydrologic processes and structures, especially the regeneration of giant sequoia and the re-introduction of fire to fire-dependent ecosystems.

Protection. This strategy addresses the risk of catastrophic fire to communities and the objects of interest.

Recreation/Human Use. This strategy addresses the need for people to interact with and enjoy the objects of interest.

Transportation. This strategy manages the road system for the proper care and management of the objects of interest.

B. Alternative 1 (No Action)

Alternative 1 is the no action alternative. Under this alternative, current management direction, the Forest Plan as amended by the Framework and the Presidential Proclamation, would continue to guide management of the Monument. No amendment to current direction would be made.

Framework land allocations and associated standards and guidelines would apply. These strategies would focus on protecting communities from catastrophic fire, restoring riparian areas, and protecting old forest habitats. No monument-wide strategy for restoration of natural processes, fire return intervals, or desired vegetative stand structure is presented. This alternative would treat approximately 42,500 acres in the first decade of implementation.

Alternative 1 would use all of the Framework strategies to protect communities, other sites occupied by people, and the objects of interest. Key strategies to reduce the risk of catastrophic fire would include the wildland urban intermix (WUI) defense zones (1/4 mile), WUI threat zones (1¼ mile), wildland fire use, and strategically placed area treatments (SPLATs). There are approximately 10,000 acres in defense zones around communities that would receive protection treatments in the first decade.

Direction for recreation from the Forest Plan would still apply in the Monument where it is not superseded by the Framework. Off-highway vehicle (OHV) use in the Monument would be limited to designated roads only.

C. *Alternative 2 (Proposed Action)*

Alternative 2 is the Proposed Action as described in the Notice of Intent published in the Federal Register and the scoping letter, both dated June 8, 2001. It does not specifically address the significant issues found in Chapter I because the issues were developed largely based on public comments to this Proposed Action.

Alternative 2 applies all the direction found in the Framework and provides additional management direction for the proper care, management, and enjoyment of the objects of interest in the Monument. It places emphasis on the application of current direction specific to the objects of interest.

Alternative 2 proposes goals to meet the desired conditions: to protect giant sequoias, their ecosystems, and the natural processes that sustain them; to improve developed and dispersed recreation opportunities; to protect and interpret historic and prehistoric resources; to provide a useful, safe, and environmentally acceptable transportation system; and to provide for scientific study of the Monument's resources.

Alternative 2 would primarily treat areas of the Monument that have high fire susceptibility to reduce the risk of catastrophic fire. The highest priority would be to protect communities and sensitive resources in the Monument. Approximately 42,000 acres would be treated in the first decade of implementation.

The following management strategies are intended to provide the direction necessary to meet the intent of Alternative 2.

Restoration Strategy. Alternative 2 would apply Framework standards and guidelines and use the Framework land allocations. For most of the Monument, these strategies would restore fire to the ecosystem to maintain or develop old forest characteristics. It would manage watersheds around groves (the zones of ecological influence) and the surrounding ecosystems by protecting them from catastrophic fire, restoring riparian areas, and protecting old forest habitat. Like the Framework, this alternative does not offer a long-term, monument-wide strategy for restoration of natural processes, fire return interval, or desired vegetative stand structure.

Protection Strategy. Alternative 2 would use all of the Framework strategies to protect communities, other sites occupied by people, and the objects of interest. Key strategies include the urban wildland intermix defense zones (1/4 mile), threat zones (1 1/4 mile), wildland fire use, and strategically placed area treatments (SPLATs) in order to reduce the risk of catastrophic fire. There are approximately 10,000 acres in defense zones around communities that would receive protection treatments in the first decade.

Recreation/Human Use Strategy. Alternative 2 would assess the increased demand for recreation in the Monument and help meet that demand for a wide variety of recreation, interpretation, and education uses. Recreation and human use

would be widespread in the Monument, not concentrated or focused in specific areas.

Transportation Strategy. Alternative 2 would emphasize retaining road access for public use and for management activities similar to current access levels, with approximately 900 miles of road. For public access, emphasis would be on maintaining roads to recreation sites, dispersed areas, special use sites, and private land. An extensive road system would be available for recreation driving and off-highway vehicle use. For management access, emphasis would be on ecosystem restoration and fire protection. Roads with high risks for causing unacceptable impacts to natural resources would be repaired, relocated, closed, or decommissioned to reduce impacts. Road decommissioning would focus on unclassified roads and those classified roads producing unacceptable impacts where repair or relocation is unreasonable. New roads could be constructed to meet management goals to provide access to new recreation facilities, to provide access to administrative sites, to replace roads producing unacceptable resource impacts, or to provide access for research. The maintenance strategy would be to continue to request funds to reduce the maintenance backlog and keep the road system in acceptable condition.

D. Alternative 3

Alternative 3 emphasizes the use of prescribed fire and associated hand treatments to reduce the risk of catastrophic fire, restore a more natural fire regime, and move resources toward their desired conditions. This alternative is similar to management strategies used in the Sequoia and Kings Canyon National Parks. Determining what vegetation could be removed for protection and restoration treatments would be based on the predicted fire behavior of prescribed fires, rather than using the diameter limits and crown canopy limits in the Framework. Approximately half of the giant sequoia groves would be identified as high profile groves and managed for protection, ecological restoration, and concentrated recreational use. Approximately 59,000 acres would be treated in the first decade of implementation. Restoration treatments would be the priority after initial protection treatments are completed.

The following management strategies are intended to provide the direction necessary to meet the intent of Alternative 3:

Restoration Strategy. Alternative 3 would reduce the number of roads and extent of the road system, as well as reduce the impacts from compacted areas in the Monument. Management would emphasize the use of prescribed fire and associated hand equipment (chainsaws) and limit the use of heavy equipment to protection activities around communities and on roads. New standards and guidelines would be proposed for vegetation management based on fire behavior predictions. High profile groves would be managed by treating only about one percent of their acreage per year, using prescribed fire and hand treatments to meet restoration goals. Restoration in the rest of the Monument would be accomplished using prescribed fire and hand treatments in restoration treatment areas.

Treatments in these areas would be based on the fire return intervals for different vegetation types, fire susceptibility, and local conditions. Treatments outside of the high profile groves would be designed to re-introduce fire to the ecosystem and to reduce the risk of catastrophic fire.

Protection Strategy. Alternative 3 would protect communities and other sites occupied by people with a defense zone that would typically be 200 feet but could range up to ¼-mile, based on local fire behavior and terrain. Use of mechanical treatments would be allowed for protection. Prescribed fire would be the primary tool to reduce the risk of catastrophic fire in the rest of the Monument. This approach would replace the community protection strategy prescribed in the Framework. There are approximately 3,000 acres in defense zones around communities that would receive protection treatments in the first decade.

Recreation/Human Use Strategy. Alternative 3 would increase the feeling of isolation from motorized use by eliminating OHV use in the Monument. Primitive and semi-primitive recreation opportunities and trails would be increased. This alternative would concentrate human use and recreation in existing developed recreation sites, along major travel routes, and in high profile giant sequoia groves. It would increase opportunities for day use and expand or implement new interpretation and education programs and facilities. The existing capacity of developed overnight facilities for visitors would be maintained, while dispersed overnight recreation use would be reduced. Dispersed recreation sites that do not meet the aquatic management strategy in the Framework would be eliminated.

Transportation Strategy. Alternative 3 would emphasize reducing environmental impacts from roads. The current designated road system includes approximately 900 miles of road. For public access, emphasis would be on maintaining road access to recreation sites, high profile giant sequoia groves, special use sites, and private land. Roads not needed for these purposes would be closed to public access. No off-highway vehicle use would be allowed on the road system. For management access, emphasis would be on ecosystem restoration and fire protection. Roads for restoration or fire protection would be decommissioned in areas where natural conditions are re-established. Roads with risks for causing unacceptable impacts to natural resources would be repaired, relocated, closed, or decommissioned to reduce impacts. Road decommissioning would focus on reducing road mileage and would include reductions of classified and unclassified roads with moderate to high risk for producing unacceptable resource impacts. New roads could be constructed to meet management goals to provide access to new recreation facilities, to provide access to new administrative sites, to relocate roads that produce unacceptable impacts, or to provide access for scientific research. The maintenance strategy would be to reduce maintenance costs by closing and decommissioning roads.

E. Alternative 4

Alternative 4 was developed to respond directly to the issue of Social Values Regarding Vegetation Treatments. This alternative would manage monument lands as a broad, connected ecosystem, without separating or zoning for management emphasis. The exception to this would be areas of high amounts of human use, including all current developed recreation areas and other areas of concentrated human use. The primary method to reduce the risk of catastrophic fire, restore desirable forest characteristics, protect and restore giant sequoia groves, and restore a more natural fire regime would be prescribed fire and hand treatments. Trees over 12 inches in diameter would not be cut, with some exceptions such as public safety and emergencies. Approximately 59,000 acres would be treated in the first decade of implementation. Restoration treatments would be the priority after initial protection treatments are completed.

The following management strategies are intended to provide the direction necessary to meet the intent of Alternative 4.

Restoration Strategy: Alternative 4 focuses on restoring desired fire return intervals and desired forest characteristics (such as a mosaic of tree species and age classes), restoring plantations and roads to natural conditions, and restoring or stabilizing riparian habitat that does not meet desired conditions. Vegetation restoration methods would generally be limited to prescribed fire and hand treatments and would be focused within the General Forest Zone. The areas and amounts to be treated would be determined in part by desired fire intervals, site-specific conditions, and protection of key resources such as giant sequoia groves and wildlife habitat. Generally, no trees larger than 12 inches in diameter would be cut, for the purpose of ecological restoration and maintenance or public safety, subject to some exceptions. Existing plantations would be managed to restore forest structure to desired conditions and to minimize the risk of catastrophic fire. Areas of riparian habitat that are degraded would be emphasized for stabilization and restoration.

Protection Strategy: Alternative 4 would protect communities and other sites occupied by people by establishing a 200-foot wide defense zone around communities and a 100-foot defense zone on either side of major roads. The purpose of the defense zone is to provide for human health and safety and reduce the fire hazard around existing structures, major roads, developed campgrounds, and developed public use areas within the Human Influence Zone. Prescribed fire, hand thinning, and mechanical thinning would be the preferred treatment methods. Mechanical treatments would include the removal of trees and brush using such equipment as feller-bunchers or chippers. Generally, no trees larger than 12 inches in diameter would be removed unless necessary for emergencies, for public safety, or for the development and maintenance of recreation and administrative sites. There are approximately 3,600 acres in defense zones around communities within the Human Influence Zone that would receive protection treatments. These would be the highest priority for treatment, with the goal of completing initial treatments within the first 5 to 10 years of plan implementation.

Recreation/Human Use Strategy: Alternative 4 responds to the recreation demand to increase recreation opportunities by increasing both developed and dispersed opportunities, winter use facilities, trails, and interpretive facilities and opportunities. Potential areas and projects for additional recreation development would be identified. Opportunities for non-motorized winter use would be enhanced to reduce conflicts with motorized users.

Transportation Strategy: Alternative 4 would emphasize reducing environmental impacts from roads while providing for public access. The current designated road system includes approximately 900 miles of road. For public access, emphasis would be on maintaining road access to recreation sites, special use sites, and private land. The road system would be available for recreational driving and off-highway vehicle use. For management access, emphasis would be on ecosystem restoration and fire protection. Roads with high risks for causing unacceptable impacts to natural resources would be repaired, relocated, closed, or decommissioned to reduce impacts. Road decommissioning would focus on unclassified and classified roads with high risks of producing unacceptable impacts. New roads could be constructed to meet management goals to provide access to new recreation facilities, to provide access to new administrative sites, to relocate roads producing unacceptable impacts, or to provide access for scientific research. The maintenance strategy would be to continue to request funds to reduce the maintenance backlog and keep the road system in acceptable condition. Roads that cannot be retained to acceptable standards would receive priority for decommissioning.

F. Alternative 5

Alternative 5 was developed to respond specifically to the Giant Sequoia and Social Values Regarding Vegetation Treatments issues by prescribing a broad range of management strategies to promote conditions for giant sequoia regeneration in the groves. These grove-specific management strategies would include prescribed fire, mechanical treatments (including heavy machinery), and removal of trees up to 30 inches in diameter to create small openings, or gaps, to promote giant sequoia regeneration. Outside of the groves, Framework allocations and management strategies, which include both prescribed fire and mechanical methods, would be applied. This alternative acknowledges that there are areas of extreme fuel loadings or other site conditions where prescribed fire alone may not be effective in meeting management goals without unacceptable risks to other resource values. As initial treatments are completed and areas are at or approaching desired conditions, prescribed fire and wildland fire use would be the primary tools used to reach and maintain desired conditions for both fire and vegetation.

Areas designated for treatments for community protection and to reduce the risk of catastrophic fire would be the first priority for treatment. Approximately 70,000 acres would be treated in the first decade of implementation.

The following management strategies are intended to provide the direction necessary to meet the intent of Alternative 5.

Restoration Strategy. Alternative 5 provides for the systematic reintroduction of fire to the ecosystem by following a new management strategy for the groves and by following Framework strategies outside of the groves. In the groves, both prescribed fire and mechanical treatments (including heavy equipment) would be allowed to meet restoration and protection goals. This approach reflects the somewhat more predictable results that can be achieved through the judicious combination of mechanical treatments and prescribed fire to achieve desired conditions. Outside of the groves, the treated areas would reduce the risk of catastrophic fire sufficiently over the long term to allow prescribed fire and wildland fire use to act as the primary tools to move toward desired conditions. Existing plantations would be managed to restore forest structure, hydrologic conditions, and minimize risks from catastrophic fire. By meeting the fuel load and fire model desired condition, fire can be safely returned to the ecosystem and allowed to remove excess ground fuels and vegetation. By using fire, we can eventually remove enough excess vegetation to meet the desired condition for vegetation stand structure. All vegetation types, including mixed conifer/sequoia, chaparral, and lower Westside hardwoods, would be included in treatment areas. Prescribed fire and wildland fire use would be used to move the area toward the desired fire return interval. The Framework's aquatic management strategy would be applied for the purpose of protecting, restoring, and stabilizing hydrologic function and structure.

Protection Strategy. Alternative 5 would protect communities, other sites occupied by people, and the objects of interest with the full range of Framework strategies. Key strategies include the urban wildland intermix defense zones (1/4 mile) and threat zones (1 ½ mile), SPLATs, and wildland fire use. There are approximately 9,350 acres in defense zones around communities that would receive protection treatments in the first decade.

Recreation/Human Use Strategy. Alternative 5 would assess the increased demand for recreation in the Monument and help meet that demand for a wide range of recreation uses. It would encourage the expansion of overnight camping opportunities near and in the groves. The focus of interpretation would be on historical areas on the Hume Lake District and on natural settings on the Tule River and Hot Springs Ranger Districts.

Transportation Strategy. Alternative 5 would emphasize retaining road access for public use and for management activities similar to current access levels, approximately 900 miles of road. For public access, emphasis would be on maintaining roads to recreation sites, dispersed areas, special use sites, and private land. An extensive road system would be available for recreation driving and off-highway vehicle use. For management access, emphasis would be on ecosystem restoration and fire protection. Roads with high risks for causing unacceptable impacts to natural resources would be repaired, relocated, closed, or decommissioned to reduce impacts. Road decommissioning would focus on

unclassified roads and those classified roads producing unacceptable impacts where repair or relocation is unreasonable. New roads could be constructed to meet management goals to provide access to new recreation facilities, to provide access to administrative sites, to replace roads producing unacceptable resource impacts, or to provide access for research. The maintenance strategy would be to continue to request funds to reduce the maintenance backlog and keep the road system in acceptable condition.

G. *Alternative 6*

Alternative 6 was developed to specifically address the significant issues of Giant Sequoia, Mixed Conifer Restoration, and Social Values Regarding Vegetation Treatments. This alternative would prescribe a broad range of management strategies to restore and protect all of the ecosystems found in the Monument, as well as promote conditions for giant sequoia regeneration in the groves. These strategies are the same as those applied to the giant sequoia groves in Alternative 5 but, in this alternative, they apply to all of the Monument ecosystems. These monument-wide management strategies would include prescribed fire, mechanical treatments (including heavy machinery), and removal of trees up to 30 inches in diameter when needed for ecological restoration and maintenance and public safety, or to create small openings, or gaps, to promote giant sequoia regeneration.

The flexible mixture of treatment methods is most responsive to and acknowledges the fact that site conditions and resource objectives will vary. The Scientific Advisory Board states in Advisory III "Fire often is a useful tool for restoring giant sequoia groves and other fire-adapted ecosystems (Hardy and Amo, 1996; Stephenson 1996, 1999). However, issues such as human safety, air quality, water quality, endangered species, cumulative impacts with other management actions, current and desired forest structure, and current fuel loads mean that fire alone cannot always be used to achieve desired forest conditions, (Weatherspoon, 1996; Fule et al, 1997; Piirto and Rogers, 1999). In areas where fire alone cannot be used to achieve desired conditions, mechanical thinning often proves to be a useful alternative (Weatherspoon, 1996)."

Outside of the groves, areas would be designated for ecological restoration treatments based on monument-wide strategies and site-specific analysis. This alternative acknowledges that there are sites where the use of prescribed fire in conjunction with mechanical methods can give reliable results. There are areas of extreme fuel loadings or other site conditions where prescribed fire alone may not be effective in meeting management goals without unacceptable risks to other resource values.

Areas designated for treatments for community protection and to reduce the risk of catastrophic fire would be the first priority for treatment. Approximately 80,000 acres would be treated in the first decade of implementation. In addition to areas treated to reduce the risk of fire, other areas could be treated to move toward the desired conditions for vegetation and to return fire-dependent ecosystems to a desired fire return interval. As these treatments are completed and the areas approach their desired condition, the program would maintain the treated areas and treat additional

areas. Over the long term, as more areas reach their desired condition, prescribed fire and wildland fire use would provide more reliable results and would be the primary tools used to reach and maintain desired conditions for both fire and vegetation.

The following management strategies are intended to provide the direction necessary to meet the intent of Alternative 6.

Restoration Strategy. Alternative 6 calls for the systematic reintroduction of fire throughout the Monument to re-establish a desired fire return interval for all fire-dependent ecosystems, including chaparral, mixed conifer-giant sequoia, and lower Westside hardwood. All vegetation types would be included in a restoration treatment area. This strategy is very similar to Alternative 5, except that this alternative would manage all of the vegetation types throughout the Monument with a combination of mechanical and prescribed fire. Existing plantations would be managed to restore forest structure, hydrologic conditions, and minimize risks from catastrophic fire. The Framework's aquatic management strategy would be applied for the purpose of protecting, restoring, and stabilizing hydrologic function and structure.

Protection Strategy. Alternative 6 would protect communities, other sites occupied by people, and the objects of interest with the full range of Framework strategies. Key strategies include the urban wildland intermix defense zones (1/4 mile) and threat zones (1 ½ mile), SPLATs, and wildland fire use. There are approximately 8,900 acres in defense zones around communities that would receive protection treatments in the first decade.

Recreation/Human Use Strategy. Alternative 6 would assess the increased demand for recreation in the Monument and help meet that demand for a wide range of recreational uses. It would encourage the expansion of overnight camping opportunities near and in the groves. It would emphasize interpretation and education of management activities, focusing on the historical areas on the Hume Lake District and on natural settings on the Tule River and Hot Springs Ranger Districts.

Transportation Strategy. Alternative 6 would emphasize retaining road access for public use and for management activities similar to current access levels, approximately 900 miles of road. For public access, emphasis would be on maintaining roads to recreation sites, dispersed areas, special use sites, and private land. An extensive road system would be available for recreation driving and off-highway vehicle use. For management access, emphasis would be on ecosystem restoration and fire protection. Roads with high risks for causing unacceptable impacts to natural resources would be repaired, relocated, closed, or decommissioned to reduce impacts. Road decommissioning would focus on unclassified roads and those classified roads producing unacceptable impacts where repair or relocation is unreasonable. New roads could be constructed to meet management goals to provide access to new recreation facilities, to provide access to administrative sites, to replace roads producing unacceptable resource impacts, or to provide access for research. The maintenance strategy

would be to continue to request funds to reduce the maintenance backlog and keep the road system in acceptable condition.

H. Modified Alternative 6

The preferred alternative is a modification of Alternative 6. As a result of public comment and scientific review, the DEIS alternatives were carefully reviewed between publication of the DEIS and this FEIS. Refinements and suggestions the Forest Service judged important to bring forward to the FEIS were collected into a modification of DEIS Alternative 6, and are displayed here as Modified Alternative 6. Modified Alternative 6 responds to the concerns raised as follows:

- The need to take immediate action to protect communities and other valuable resources from catastrophic fire and to begin ecological restoration of plantations created as a result of past wildfires and harvesting. The Protection Strategy for Modified Alternative 6 makes the completion of treatments in the Wildland Urban Intermix Defense and Threat Zones and in areas around the giant sequoia groves the highest priorities for the first two decades. The Restoration Strategy sets the restoration of recent wildfires, logged areas, and associated roads, landings, and skid trails as the highest priority for that time period.
- A more clear description of the conservation strategy for old forest habitat, one that balances the immediate short-term need to protect communities and resources from catastrophic wildfire with the need to protect and sustain critical old forest habitat. The conservation strategy for both short-term and long-term protection and restoration of critical late seral stage habitat is embedded in and consistent with the Protection and Restoration Strategies for Modified Alternative 6.
- There is uncertainty regarding the efficacy and ecological effects of using mechanical methods and prescribed fire to implement the protection and restoration strategies and move toward desired conditions. Modified Alternative 6 emphasizes prescribed fire as the preferred treatment method to reach ecological restoration and public safety objectives, including the need to promote giant sequoia regeneration. While prescribed fire would be the preferred method, either fire or mechanical methods could be used for vegetation management treatments. The choice of method would be based on a site-specific project analysis to determine if prescribed fire alone could be used to meet objectives or if mechanical treatments and/or tree removal are clearly needed for ecological restoration and maintenance or public safety.
- There is considerable lack of trust on the part of some members of the public that the management of the Monument will truly embrace the spirit and intent of the Presidential Proclamation, given the controversial history of logging and wood production on the Sequoia National Forest. In Modified Alternative 6, prescribed fire would be used for vegetation management treatments unless a site-specific project analysis clearly shows that mechanical treatments and/or tree removal are clearly needed for ecological restoration and maintenance or public safety. The Restoration Strategy sets the restoration of recent wildfires,

logged areas and associated roads, landings, and skid trails as the highest priorities for the first two decades.

Approximately 63,840 acres would be treated in the first decade of implementation in Modified Alternative 6. Prescribed fire would be used for vegetation management treatments unless a site-specific project analysis clearly shows that mechanical treatments and/or tree removal are clearly needed for ecological restoration and maintenance or public safety. Wildland fire use (allowing some naturally ignited fires to burn) would be included. When mechanical treatments are necessary, removal of trees up to 30 inches in diameter would be allowed. This diameter limit is based upon analysis of local information for the vegetation in the Monument. This analysis indicates that most of the trees contributing to overly dense stand conditions and presenting a fuels problem are less than 130 years old and less than 30 inches in diameter.

The following management strategies are intended to provide the direction necessary to meet the intent of Modified Alternative 6.

Restoration Strategy. Modified Alternative 6 calls for the systematic reintroduction of fire throughout the Monument to re-establish a desired fire return interval for all fire-dependent ecosystems, including chaparral, mixed conifer-giant sequoia, and lower Westside hardwood. It would reduce the excessive fuel loads caused by long-term fire suppression. During the first two decades, it would emphasize the restoration of plantations in the Monument, primarily those started in the last 50 years to restore logged or burned areas. These plantations (including those in giant sequoia groves) would be managed to restore forest structure, hydrologic conditions, and minimize risks from catastrophic fire. Roads associated with these plantations would also be evaluated for restoration. In other areas of the Monument, more natural structural conditions such as stand densities, species composition, and new patches of young vegetation (especially giant sequoias, pines, and black oaks) would be re-established. Prescribed fire (including wildland fire use) would be the primary treatment method.

Restoration treatment areas would be located across the Monument and in different vegetation types, ranging from 50 to 500 acres in size. Management in these areas would focus on the restoration of fire to the ecosystem and re-establishing more natural structural conditions, rather than protection. Prescribed fire (including wildland fire use) would be the preferred treatment method. The Framework's aquatic management strategy would be applied for the purpose of protecting, restoring, and stabilizing hydrologic function and structure. The boundaries of restoration treatment areas would be determined during landscape analyses.

Protection Strategy. Modified Alternative 6 would protect communities, other sites occupied by people, the objects of interest, and other important resources such as aquatic or wildlife habitat with the full range of Framework strategies. Key strategies include the urban wildland intermix threat and defense zones,

SPLATs, and wildland fire use. Additional management direction is provided to protect old forest habitat. Protection treatments would be implemented within the first two decades. There are approximately 12,250 acres in defense zones around communities that would receive protection treatments in the first decade.

Recreation/Human Use Strategy. Modified Alternative 6 encourages and focuses the development of recreation facilities to meet the increased demand for recreation in the Monument. It encourages the expansion of overnight camping, picnicking, trailheads, and interpretive opportunities. It would emphasize interpretation and education, focusing on the historical areas on the Hume Lake District and on natural settings on the Tule River and Hot Springs Ranger Districts. The current road system would be maintained to allow visitors to explore the Monument and choose dispersed, primitive recreation sites as an alternative to developed camping or picnicking sites.

Transportation Strategy. Modified Alternative 6 would emphasize retaining road access for public use and for management activities similar to current access levels, approximately 900 miles of road. For public access, emphasis would be on maintaining roads to recreation sites, dispersed areas, special use sites, and private land. An extensive road system would be available for dispersed camping, recreational driving, and off-highway vehicle use. For management access, emphasis would be on ecosystem restoration and fire protection. Roads with high risks for causing unacceptable impacts to natural resources would be repaired, relocated, closed, or decommissioned to reduce impacts. Road decommissioning would focus on unclassified roads and those classified roads producing unacceptable impacts where repair or relocation is unreasonable. New roads could be constructed to meet management goals to provide access to new recreation facilities, to provide access to administrative sites, to replace roads producing unacceptable resource impacts, or to provide access for research. The maintenance strategy would be to continue to request funds to reduce the maintenance backlog and keep the road system in acceptable condition. Roads that cannot be maintained in acceptable condition would be closed or decommissioned.

In Modified Alternative 6, treatment priorities address the need to take immediate action to protect communities and the objects of interest, as well as restoring more natural conditions in the Monument. The treatment priorities implementing protection strategies would be slightly different than the other alternatives in that additional emphasis would be placed on protecting giant sequoia groves. The treatment priority to implement restoration strategies would be to treat the plantations created by wildfires and past harvesting practices, followed by restoration of a more frequent fire return interval. These treatment priorities are consistent with the National Fire Plan.

I. Comparison of Alternatives

Tables II-3, II-4, and II-5 summarize the alternatives by issues, treatment methods, and strategy, respectively.

Table II-3: Comparison of Alternatives by Issues and Indicators

Alternative	Air Quality Issue PM-10 emissions (tons) generated by underburning and pile burning in the first decade.	Fire Issue a. Acres treated to move the fire susceptibility rating from moderate or high toward low. b. Acres treated to move toward historic fire return intervals.
Alternative 1	445	a. & b. approximately 42,500 acres (in the first decade).
Alternative 2	380	a. & b. approximately 42,000 acres (in the first decade).
Alternative 3	855	a. & b. approximately 59,000 acres (in the first decade).
Alternative 4	890	a. & b. approximately 59,000 acres (in the first decade).
Alternative 5	1,100	a. & b. approximately 70,000 acres (in the first decade).
Alternative 6	1,040	a. & b. approximately 80,000 acres (in the first decade).
Modified Alternative 6	437	a. & b. approximately 64,000 acres (in the first decade).

Table II-3: Comparison of Alternatives by Issues and Indicators (continued)

<p>Alternative</p>	<p>Giant Sequoia and Mixed Conifer Restoration Issue The amount of predicted change in conditions and trends to the following key ecological indicators (Piirto and Rogers, 1999) as compared to the desired condition: a. gap and patch size b. plant community c. risk from severe fires d. fire return interval (this last indicator is discussed under Fire and Fuels)</p>
<p>Alternative 1</p>	<p>No major restoration of desired fire return interval or other key ecological components (gaps, tree density) outside of SPLATs and wildland urban intermix zones (approximately 50% of area has no planned treatment). Current trends and conditions continue in these untreated areas. Gaps created in groves from prescribed fire. Alts 1 and 2 treat approximately 40,000 acres of mixed conifer forest in first 10 years leading to patches of new vegetation and reduced stand densities. Amounts of gaps are uncertain. a. Gap size probably meeting desired condition. . b. Giant sequoia and pines increase in understory in gaps, however new vegetation outside of WUI areas would be primarily in response to natural events, such as wildfire, insects, or drought. Fewest amount of gaps created than all alternatives except Alternative 2. c. Within 3 decades, almost all groves meet desired condition for fire severity.</p>
<p>Alternative 2</p>	<p>No major restoration of fire or other key ecological components (gaps, tree density) outside of SPLATs and urban wildland intermix zones (approximately 50% of area has no planned treatment). Current trends and conditions continue in these untreated areas. Gaps created in groves from prescribed fire. . Alts 1 and 2 treat approximately 40,000 acres of mixed conifer forest in first 10 years leading to patches of new vegetation and reduced stand densities. Amounts of gaps are uncertain. a. Gap size probably meeting desired condition b. Giant sequoia and pines increase in understory in gaps, however new vegetation outside of WUI areas would be in response to natural events, such as wildfire, insects, or drought. Fewer amounts of gaps created than all alternatives except for Alternative 2. c. Within 3 decades, almost all groves meet desired condition for fire severity.</p>
<p>Alternative 3</p>	<p>Emphasis on grove management in high profile groves. Rest of groves treated as part of mixed conifer ecosystem, using prescribed fire. Approximately 58,000 acres of mixed conifer forest treated in first 10 years, leading to patches of new vegetation and reduced stand densities. a. Gap sizes less likely to meet desired conditions (More gaps larger than 2 acres are likely as compared to all alternatives except Alt 4). Amounts of gaps are uncertain b. Giant sequoias and pines increase in understory in gaps. c. Unknown when groves will meet desired condition for fire severity. No focused protection strategy planned for groves outside of HIZ. Least short-term protection to groves (limited to defense zones around communities).</p>
<p>Alternative 4</p>	<p>No emphasis on grove restoration or protection except as part of mixed conifer ecosystem. Prescribed fire on approximately 54,000 acres of mixed conifer forest treated in first 10 years, leading to patches of new vegetation and reduced stand densities... a. Gap sizes least likely to meet desired condition (More gaps larger than 2 acres are likely as compared to any other alternative). Amounts of gaps are uncertain b. Giant sequoias and pines increase in understory in gaps. c. Unknown when groves will meet desired condition for fire severity. No focused protection strategy planned for groves outside of HIZ. Least short-term protection to groves (limited to defense zones around communities).</p>

Alternative	<p>Giant Sequoia and Mixed Conifer Restoration Issue</p> <p>The amount of predicted change in conditions and trends to the following key ecological indicators (Piirto and Rogers, 1999) as compared to the desired condition:</p> <ul style="list-style-type: none"> a. gap and patch size b. plant community c. risk from severe fires d. fire return interval (this last indicator is discussed under Fire and Fuels)
Alternative 5	<p>Within GS groves, approximately 550 acres treated in 1st decade with gap creation, thinning, and prescribed fire, leading to an estimated 60 acres of new gaps in small openings usually around 1 acre or less in size, consistent with desired condition. . Approximately 55,000 acres of mixed conifer forest in total treated in first 10 years, leading to patches of new vegetation and reduced stand densities.</p> <ul style="list-style-type: none"> a. Gap size probably meeting desired condition. . Some gap sizes larger than ¼ to 2 acres in size, but not as much as Alts 3 & 4. b. Giant sequoia and pines increasing in understory in gaps. c. Almost all groves meet desired condition for reduced risk from severe wildfires in 3 decades.
Alternative 6	<p>Within groves, approximately 1,700 acres treated in 1st decade with gap creation, thinning, and prescribed fire, leading to an estimated 170 acres of new gaps in small openings usually around 1 acre or less in size, consistent with desired conditions. Approximately 72,000 acres of mixed conifer forest in total treated in first 10 years, leading to patches of new vegetation and reduced stand densities. Outside of groves, prescribed fire on approx. 19,000 acres creates additional gaps – amount is uncertain.</p> <ul style="list-style-type: none"> a. Some gap sizes larger than 2 acres. Frequency is less than all other alts. Gap development and new vegetation more consistent with desired condition than all other alternatives. b. Giant sequoia and pines increasing in understory in gaps. c. Almost all groves meet desired condition for reduced risk from severe wildfires in 3 decades.
Modified Alternative 6	<p>Approximately 62,000 acres of mixed conifer forest in total treated in first 10 years, leading to patches of new vegetation and reduced stand densities. Approximately 11,500 acres treated in 1st twenty years in groves, primarily with understory thinning, prescribed burning, or hand treatments</p> <ul style="list-style-type: none"> a. Some gap sizes larger than 2 acres. Amount of gaps and young trees greater than Alts 1-5; less than Alt 6. Gap development and new vegetation more consistent with desired condition than Alts 3 & 4. b. Giant sequoia and pines increasing in understory in gaps. c. Almost all groves meet desired condition for reduced risk from severe wildfires in 3 decades.

Table II-3: Comparison of Alternatives by Issues and Indicators (continued)

Alternative	Recreation Issue a. Change in People at One Time (PAOT) that can be served by recreational, interpretive, and educational facilities. b. Estimated capacity of dispersed recreation. c. Predicted mileage of roads and trails available for public use.
Alternative 1	a. There are no specific goals or plans for development of additional recreation sites. No expected change in capacity for People At One Time (PAOT) in the next decade at developed recreation facilities. b. There would be no expected change in the capacity for dispersed recreation. c. Approximately 900 miles of roads and 160 miles of trails available. Additional trails may be developed, but there are not goals or plans for expansion.
Alternative 2	a. Expansion of single-family campgrounds, group campgrounds, and picnic sites has the potential to increase capacity for these types of facilities by up to 70%, from 3225 People At One Time (PAOT) to 5525 PAOT. Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%. b. There would be no expected change in the capacity for dispersed recreation that is accessed by automobile along the road system. The combined increase in trail mileage, trailheads, and parking could be up to 25% of current availability. c. Approximately 900 miles of roads and 180 miles of trails for public use.
Alternative 3	a. Maintain current capacity for overnight camping (2960 PAOT). Picnic sites could increase by 185 PAOTs. Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%. b. Lands and roads within the Monument would be limited for dispersed recreation use. No OHV use in the Monument. No camping outside of developed recreation sites in the High Profile Grove Management Area. 45% expected reduction in the capacity for dispersed recreation accessible by automobile along the road system. The combined increase in trail mileage, trailheads, and parking could be from 25-100% of current availability. c. Approximately 500 miles of roads and 180 miles of trails plus 150 miles of road may be available for conversion from roads to trails.
Alternative 4	a. Expansion of single-family campgrounds, group campgrounds, and picnic sites has the potential to increase capacity for these types of facilities by up to 60%, from 3225 People At One Time (PAOT) to 5225 PAOT. Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%. b. 5% expected reduction in the capacity for dispersed recreation accessible by automobile along the road system. The combined increase in trail mileage, trailheads, and parking could be up to 25% of current availability. c. Approximately 875 miles of roads and 180 miles of trails plus 25 miles of road may be available for conversion from roads to trails.
Alternative 5	a. Expansion of single-family campgrounds, group campgrounds, and picnic sites has the potential to increase capacity for these types of facilities by up to 70%, from 3225 People At One Time (PAOT) to 5525 PAOT. Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%. b. There would be no expected change in the capacity for dispersed recreation that is accessed by automobile along the road system. The combined increase in trail mileage, trailheads, and parking could be up to 25% of current availability. c. Approximately 900 miles of roads and 180 miles of trails for public use.

Alternative	<p>Recreation Issue</p> <ul style="list-style-type: none"> a. Change in People at One Time (PAOT) that can be served by recreational, interpretive, and educational facilities. b. Estimated capacity of dispersed recreation. c. Predicted mileage of roads and trails available for public use.
Alternative 6	<ul style="list-style-type: none"> a. Expansion of single-family campgrounds, group campgrounds, and picnic sites has the potential to increase capacity for these types of facilities by up to 70%, from 3225 People At One Time (PAOT) to 5525 PAOT. Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%. b. There would be no expected change in the capacity for dispersed recreation that is accessed by automobile along the road system. The combined increase in trail mileage, trailheads, and parking could be up to 25% of current availability. c. Approximately 900 miles of roads and 180 miles of trails for public use.
Modified Alternative 6	<ul style="list-style-type: none"> a. Expansion of single-family campgrounds, group campgrounds, and picnic sites has the potential to increase capacity for these types of facilities by up to 70%, from 3225 People At One Time (PAOT) to 5525 PAOT. Expansion of interpretive and educational sites could expand the capacity of interpretive facilities by up to 45%. b. There would be no expected change in the capacity for dispersed recreation that is accessed by automobile along the road system. The combined increase in trail mileage, trailheads, and parking could be up to 25% of current availability. c. Approximately 900 miles of roads and 180 miles of trails for public use.

Table II-3: Comparison of Alternatives by Issues and Indicators (continued)

Alternative	Social Values Regarding Vegetation Treatments Issue a. Wood products available from protection and restoration treatments. b. Acres of mechanical treatments per year.
Alternative 1	a. 1 million cubic feet (5 million board feet) per year, first decade. b. 2,105 acres per year, first decade.
Alternative 2	a. 1 million cubic feet (5 million board feet) per year, first decade. b. 1,950 acres per year.
Alternative 3	a. 0.2 million cubic feet (1 million board feet) per year, first decade. b. 560 acres per year.
Alternative 4	a. None. b. 330 acres per year.
Alternative 5	a. 1 million cubic feet (5 million board feet) per year, first decade. b. 3,810 acres per year.
Alternative 6	a. 2.1 million cubic feet (10.5 million board feet) per year, first decade. b. 3,510 acres per year.
Modified Alternative 6	a. 1.5 million cubic feet (7.5 million board feet) per year, first decade. b. 4,050 acres per year. *

*Although Modified Alternative 6 is estimated by computer modeling to treat more acres than any other alternative, the predicted volume is less than Alternative 6 because:

- 1) there is no "gap thin" prescription
- 2) Modified Alternative 6 emphasizes mechanical treatments in existing plantations, where prescribed fire alone is likely to produce unacceptable damage to the young trees. Generally, trees in the plantations range from 8 to 12 inches in diameter, producing less volume when removed.

Table II-3: Comparison of Alternatives by Issues and Indicators (continued)

Alternative	Watershed Issue a. Acres with a prescription that would move the fire susceptibility rating toward low and reduce effects from catastrophic wildfire. b. Potential risk of cumulative effects within the total acres of watersheds that contain Monument lands: -- Percent of ground-based treatment -- Percent of non-ground-based treatment (burning). -- Total system road miles open for public use.
Alternative 1	a. Approximately 42,500 acres (in the first decade) b. 5.8 % total treatment. -- 50% ground-based treatment -- 50% non-ground-based treatment -- 900 miles
Alternative 2	a. Approximately 42,000 acres (in the first decade). b. 5.8% total treatment. -- 47% ground-based treatment -- 53% non-ground-based treatment -- 900 miles
Alternative 3	a. Approximately 59,000 acres (in the first decade). b. 7.5% total treatment. -- 10% ground-based treatment -- 90% non-ground-based treatment -- 515 miles
Alternative 4	a. Approximately 59,000 acres (in the first decade) b. 7.5% total treatment. -- 6% ground-based treatment -- 94% non-ground-based treatment -- 875 miles
Alternative 5	a. Approximately 70,000 acres (in the first decade). b. 9.6% total treatment. -- 54% ground-based treatment -- 46% non-ground based treatment -- 900 miles
Alternative 6	a. Approximately 80,000 acres (in the first decade). b. 10.9% total treatment. -- 44% ground-based treatment -- 56% non-ground-based treatment -- 900 miles
Modified Alternative 6	a. Approximately 64,000 acres (in the first decade). b. 9.8% total treatment. -- 63% ground-based treatment -- 37% non-ground-based treatment -- 900 miles

Table II-3: Comparison of Alternatives by Issues and Indicators (continued)

Alternative	<p>Wildlife Issue Predicted change in the acres of late seral/old growth habitat (LSOG, as defined in the Sierra Nevada Ecosystem Report) by the following habitat elements: a. Number of large trees over 30" per acre b. Changes in spotted owl habitat c. Number of snags over 15" per acre</p>
Alternative 1	LSOG ranks 4 and 5 acres increase steadily to approx. 190,000 acres over next 150 years. a. Large trees increase from <6 per acre to >7 per acre over next 20 years. b. Spotted owl nesting habitat increases by approximately 35% in the next 20 years. c. Snags over 15" increase from >3 per acre to >5 per acre in the next 20 years.
Alternative 2	LSOG ranks 4 and 5 acres increase steadily to approx. 190,000 acres over next 150 years. a. Large trees increase from <6 per acre to >7 per acre over next 20 years. . b. Spotted owl nesting habitat increases by approximately 35% in the next 20 years. c. Snags over 15" increase from >3 per acre to >5 per acre in the next 20 years.
Alternative 3	LSOG ranks 4 and 5 acres increase steadily to just over 160,000 acres in next 150 years. a. Large trees lost to fire in the short term. Large trees increase from <6 per acre to >7 per acre over next 20 years. b. Spotted owl nesting habitat suffers in the short term but increases approximately 39% in the next 20 years. c. Large snags over 15" increase. from >3 per acre to >5 per acre in the next 20 years.
Alternative 4	LSOG ranks 4 and 5 acres increase steadily to just over 160,000 acres in next 150 years. a. Large trees lost to fire in the short term. Large trees increase from <6 per acre to >7 per acre over next 20 years. b. Spotted owl nesting habitat suffers in the short term but increases approximately 41% in the next 20 years. c. Large snags over 15" increase from >3 per acre to >5 per acre in the next 20 years.
Alternative 5	LSOG ranks 4 and 5 acres increase steadily to approx. 180,000 acres over next 150 years. a. Large trees increase from <6 per acre to >7 per acre over next 20 years. b. Spotted owl nesting habitat increases by approximately 36% in the next 20 years. c. Snags over 15" increase from >3 per acre to >5 per acre in the next 20 years.
Alternative 6	LSOG ranks 4 and 5 acres increase steadily to approx. 200,000 acre over next 150 years. a. Large trees increase from <6 per acre to >7 per acre over next 20 years. b. Spotted owl nesting habitat increases by approximately 30% in the next 20 years. c. Large snags over 15" increase from >3 per acre to >5 per acre in the next 20 years.
Modified Alternative 6	LSOG ranks 4 and 5 acres increase steadily to approx. 230,000 acre over next 150 years. a. Large trees increase from <6 per acre to >7 per acre over next 20 years. b. Spotted owl nesting habitat increases by approximately 38% in the next 20 years. c. Large snags over 15" increase from >3 per acre to >5 per acre in the next 20 years.

The following acreages were developed for use in the analysis of effects of implementing the alternatives. They were developed using the Spectrum computer modeling system and applying the management direction and standards and guidelines for each alternative. These figures are estimates of treatments for the first decade of implementation and are not intended to be site-specific. The actual amount of area treated would vary as landscape and site-specific project analyses are conducted.

**Table II-4: Comparison of Alternatives by Treatment Methods for the First Decade
(Approximate Acres and Costs)**

Treatment Method	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Modified Alt 6
Prescribed Burning - Chaparral/Hardwood	1,840 acres (\$643,200)	1,840 acres (\$643,200)	930 acres (\$324,600)	3,700 acres (\$1,293,000)	4,350 acres (\$1,516,400)	6,510 acres (\$2,271,300)	350 acres (\$122,500)
Prescribed Burning – 2-foot flame length – Conifer	0 acres	0 acres	17,770 acres (\$6,202,800)	22,270 acres (\$7,770,800)	9,880 acres (\$3,449,200)	28,450 acres (\$9,927,300)	9,170 acres (\$3,209,500)
Prescribed Burning – 4-foot flame length - Conifer	19,480 acres (\$6,798,200)	20,500 acres (\$7,155,500)	34,670 acres (\$12,099,500)	29,700 acres (\$10,363,600)	17,690 acres (\$6,173,500)	9,900 acres (\$3,454,800)	2,380 acres (\$833,000)
Mechanical Treatment – Chaparral	0 acres	0 acres	0 acres	0 acres	10,760 acres (\$5,304,200)	1,800 acres (\$885,400)	1,870 acres (\$918,564)
Mechanical Thinning - Conifer	11,130 acres (\$5,417,100)	9,500 acres (\$4,630,800)	2,630 acres (\$1,296,100)	3,330 acres (\$1,643,700)	17,400 acres (\$8,524,000)	22,550 acres (\$9,762,000)	28,450 acres (\$13,994,000)
Mechanical Thinning with Gap Creation – Giant Sequoia Groves	0 acres	0 acres	0 acres	0 acres	575 acres (\$456,800)	1,800 acres (\$683,000)	0 acres
Hand Treatments outside Plantations	0 acres	11,410 acres (\$9,698,500)					
Plantations: Mechanical with prescribed fire	0 acres	10,200 acres (\$5,610,000)					
Fuels Treatments in Defense Zones	9,920 acres (\$5,249,800)	9,980 acres (\$5,278,900)	3,000 acres (\$1,275,000)	3,600 acres (\$1,530,000)	9,350 acres (\$4,944,000)	8,900 acres (\$4,708,100)	12,250 acres (\$5,206,250)
TOTAL TREATMENTS	42,370 acres (\$18,108,300)	41,820 acres (\$17,708,400)	59,000 acres (\$21,198,000)	58,990 acres (\$21,071,100)	70,000 acres (\$30,368,100)	79,900 acres (\$31,691,900)	63,830 acres (\$34,386,100)

*The estimated treatment acres and costs for these fuels treatments in defense zones are already reflected in the amounts for other treatment methods.

Table II-5: Comparison of Alternatives by Strategy

Alternative	Allocations/Management Areas
Alternative 1	Apply all Framework allocations:
Alternative 2	Apply all Framework allocations and the following management areas: -- ZOI-WG (Zones of Influence with Groves) -- HLHA (Hume Lake Historic Area) -- GML (General Monument Lands)
Alternative 3	Apply some Framework allocations and the following management areas: -- HPG (High Profile Groves) -- HLHA (Hume Lake Historic Area) -- GMA (General Monument Area)
Alternative 4	Apply some Framework allocations and the following management areas: -- HIZ (Human Influence Zone) -- GFZ (General Forest Zone)
Alternative 5	Apply most Framework allocations and the following management areas: -- ZOI-NG (Zones of Influence without the Groves) -- HLHA (Hume Lake Historic Area) -- GML (General Monument Lands) -- GSG1 (groves dominated by trees >150 years old, with less than 3% other age groups) -- GSG2 (groves with trees 20 to 150 years old) -- GSG3 (groves with trees 10 to 20 years old)
Alternative 6	Apply some Framework allocations and the following management areas: -- ZOI-NG (Zones of Influence without the Groves) -- HLHA (Hume Lake Historic Area) -- GML (General Monument Lands) -- GSG1 (groves dominated by trees >150 years old, with less than 3% other age groups) -- GSG2 (groves with trees 20 to 150 years old) -- GSG3 (groves with trees 10 to 20 years old)

Alternative	Allocations/Management Areas
<p>Modified Alternative 6</p>	<p>Apply some Framework allocations and the following management areas:</p> <ul style="list-style-type: none"> -- ZOI-NG (Zones of Influence without the Groves) -- HLHA (Hume Lake Historic Area) -- GML (General Monument Lands) -- GSG1 (groves dominated by trees >150 years old, with less than 3% other age groups) -- GSG2 (groves with trees 20 to 150 years old) -- GSG3 (groves with trees 10 to 20 years old) <p>Establish a new allocation: Fisher/Old Forest, to replace the Old Forest Emphasis and Southern Sierra Fisher Conservation Area allocations.</p>

Table II-5: Comparison of Alternatives by Strategy (continued)

Alternative	Restoration Strategy (The strategy that addresses the need to restore key terrestrial and hydrologic processes and structures, especially the regeneration of giant sequoias and the re-introduction of fire to fire-dependent ecosystems.)
Alternative 1	No explicit management strategy to restore fire to Monument ecosystems. Manage watersheds to protect them from catastrophic fire, restore riparian areas, and protect old forest habitat. Apply aquatic management strategy from Framework. Manage plantations to restore forest structure, hydrologic conditions, and minimize risks from catastrophic fire. Generally don't remove trees larger than 30".
Alternative 2	No explicit management strategy to restore fire to Monument ecosystems. Manage watersheds to protect them from catastrophic fire, restore riparian areas, and protect old forest habitat. Apply aquatic management strategy from Framework. Manage plantations to restore forest structure, hydrologic conditions, and minimize risks from catastrophic fire. Generally don't remove trees larger than 30".
Alternative 3	Re-introduce fire, restore desired fire return intervals and forest/aquatic characteristics in general monument area, using prescribed fire and hand treatments. Specific fire restoration strategy to treat 1% of high profile groves per year. Treatment rate in general monument area based on desired fire return intervals. Base standards and guidelines for vegetation management on fire behavior predictions. Treat one percent of the acres in high profile groves each year. Emphasize the use of prescribed fire and associated hand treatments (chainsaws). Reduce impacts from compacted areas. Limit heavy equipment use to protection activities around communities and on roads.
Alternative 4	Re-introduce fire, restore desired fire return intervals and forest/aquatic characteristics in general forest zone, using fire and hand treatments. Specific fire restoration strategy proposed; treatment rate based on desired fire return intervals. Manage plantations to restore forest structure and minimize risk of catastrophic fire. Restore plantations and roads to natural conditions. Restore or stabilize riparian habitat. Focus vegetation restoration in general forest zone, using prescribed fire and hand treatments. Generally, don't remove any trees larger than 12".
Alternative 5	Systematically re-introduce fire to ecosystems using new management strategy for the groves and the Framework outside the groves. Specific fire restoration strategy established. Outside of urban wildland intermix, treatment rates based on desired fire return intervals. Allow both prescribed fire and mechanical treatments (including heavy equipment) in groves. Outside of groves, follow Framework. Reduce risk of catastrophic fire to allow prescribed fire and wildland fire use to be primary tools to maintain desired conditions. Manage plantations to restore forest structure, hydrologic conditions, and minimize risk from catastrophic fire. Apply aquatic management strategy from Framework. Generally, don't remove trees larger than 30".
Alternative 6	Systematically re-introduce fire to re-establish desired fire return interval for all fire-dependent ecosystems. Specific fire restoration strategy established. Outside of urban wildland intermix, treatment rates based on desired fire return intervals. Allow both prescribed fire and mechanical treatments (including heavy equipment) in entire Monument and allow most flexibility with treatment methods. Include all vegetation types in restoration treatment areas. Apply a combination of mechanical and prescribed fire. Manage plantations to restore forest structure, hydrologic conditions, and minimize risks from catastrophic fire. Apply aquatic management strategy from Framework. Generally, don't remove trees larger than 30".
Modified Alternative 6	Systematically re-introduce fire to re-establish desired fire return interval for all fire-dependent ecosystems. Specific fire restoration strategy established. Outside of urban wildland intermix, treatment rates based on desired fire return intervals. Consider prescribed fire first as treatment method. Utilize tree cutting and/or mechanical treatments only when clearly needed for ecological restoration or public safety. . Include all vegetation types in restoration treatment areas. Make plantations the first priority for restoration, and manage them to restore forest structure, hydrologic conditions, and minimize risks from catastrophic fire. Apply aquatic management strategy from Framework. Generally, don't remove trees larger than 30" and focus treatments on vegetation less than 130 years old (smaller diameter trees).

Table II-5: Comparison of Alternatives by Strategy (continued)

Alternative	Protection Strategy (The strategy to reduce the risk of catastrophic fire to communities and the objects of interest.)
Alternative 1	Use Framework strategies to protect communities, other sites occupied by people, and the objects of interest. Use the urban wildland intermix defense and threat zones, wildland fire use, and SPLATs to reduce risk of catastrophic fire. Implementation work is the highest priority for treatment.
Alternative 2	Use Framework strategies to protect communities, other sites occupied by people, and the objects of interest. Use the urban wildland intermix defense and threat zones, wildland fire use, and SPLATs to reduce risk of catastrophic fire. Implementation work is the highest priority for treatment.
Alternative 3	Protect communities and other sites occupied by people with a defense zone that would typically be 200 feet but could range up to ¼-mile, based on local fire behavior and terrain. Use prescribed fire as primary tool to reduce the risk of catastrophic fire in the rest of the Monument. Implementation work is the highest priority for treatment.
Alternative 4	Protect communities and other sites occupied by people by establishing a 200-foot wide defense zone around communities and a 100-foot defense zone on either side of major roads within the human influence zone. Use prescribed fire, hand thinning, and mechanical thinning. Remove trees and brush along roads. Limit roadside trees removed in the general forest zone to those less than 12 inches in diameter that pose a risk to public health and safety. Implementation work is the highest priority for treatment.
Alternative 5	Use Framework strategies to protect communities, other sites occupied by people, and the objects of interest. Use the urban wildland intermix defense and threat zones, wildland fire use, and SPLATs to reduce risk of catastrophic fire. Implementation work is the highest priority for treatment.
Alternative 6	Use Framework strategies to protect communities, other sites occupied by people, and the objects of interest. Use the urban wildland intermix defense and threat zones, wildland fire use, and SPLATs to reduce risk of catastrophic fire. Implementation work is the highest priority for treatment.
Modified Alternative 6	Use Framework strategies to protect communities, other sites occupied by people, and the objects of interest. Use the urban wildland intermix defense and threat zones, wildland fire use, and SPLATs to reduce risk of catastrophic fire. Also design SPLATs for the protection of giant sequoia groves. Implementation work is the highest priority for treatment.

Table II-5: Comparison of Alternatives by Strategy (continued)

Alternative	Recreation/Human Use Strategy (The strategy to address the need for people to interact with and enjoy the objects of interest.)
Alternative 1	Apply direction from the Forest Plan. The Framework did not develop a recreation and human use strategy. The Proclamation limited OHV use to designated roads in the Monument.
Alternative 2	Assess increased demand for recreation in the Monument and help meet that demand for a wide variety of recreation, interpretation, and education uses. Spread recreation and human use through the Monument.
Alternative 3	Increased feeling of isolation due to eliminating OHV use. Increase primitive recreation and trails. Concentrate human use and recreation in high profile groves. Increase opportunities for day use and expand or implement new interpretation and education programs and facilities. Maintain existing capacity of developed overnight facilities; reduce dispersed overnight recreation use. Eliminate dispersed sites that don't meet aquatic management strategy of the Framework.
Alternative 4	Increase both developed and dispersed opportunities, winter use facilities, trails, and interpretative facilities and opportunities. Identify potential areas and projects for additional recreation development. Enhance opportunities for non-motorized winter use to reduce conflicts with motorized users.
Alternative 5	Assess increased demand for recreation in the Monument and help meet that demand for a wide variety of recreation uses. Encourage the expansion of overnight camping facilities in and near groves. Focus interpretation on historical areas on the Hume Lake Ranger District and on natural settings on the Tule River and Hot Springs Ranger Districts.
Alternative 6	Assess increased demand for recreation in the Monument and help meet that demand for a wide variety of recreation uses. Encourage the expansion of overnight camping facilities in and near groves. Emphasize interpretation and education of management activities, focusing on historical areas on the Hume Lake Ranger District and on natural settings on the Tule River and Hot Springs Ranger Districts.
Modified Alternative 6	Assess increased demand for recreation in the Monument and help meet that demand for a wide variety of recreation uses. Emphasize interpretation and education of management activities, focusing on historical areas on the Hume Lake Ranger District and on natural settings on the Tule River and Hot Springs Ranger Districts.

Table II-5: Comparison of Alternatives by Strategy (continued)

Alternative	Transportation Strategy (The strategy to manage the road system for the proper care and management of the objects of interest.)
Alternative 1	Apply current direction until Monument Plan is developed.
Alternative 2	Retain road access for both public and management use. Repair, relocate, close, or decommission roads to reduce impacts to natural resources. Construct new roads to provide access to new recreation facilities, administrative sites, or research, or to replace roads producing impacts. Continue to request funds to reduce maintenance backlog and keep system in acceptable condition.
Alternative 3	Reduce environmental impacts from roads. Repair, relocate, close, or decommission roads to reduce impacts to natural resources. Do not allow OHV use on road system. Emphasize public access to recreation sites, high profile groves, special use sites, and private land. Close other roads to public access. Emphasize mgmt. access for ecosystem restoration and fire protection. Decommission roads where natural conditions are re-established. Construct new roads to provide access to new recreation facilities, admin sites, or research, or to replace roads producing impacts.
Alternative 4	Reduce environmental impacts from roads while providing for public access. Repair, relocate, close, or decommission roads to reduce impacts to natural resources. Road system available for recreational driving and OHV use. Emphasize public access to recreation sites, special use sites, and private land. Emphasize mgmt. access for ecosystem restoration and fire protection. Construct new roads to provide access to new recreation facilities, administrative sites, or research, or to replace roads producing impacts. Continue to request funds to reduce maintenance backlog and keep system in acceptable condition.
Alternative 5	Retain road access for both public and management use. Repair, relocate, close, or decommission roads to reduce impacts to natural resources. Road system available for recreational driving and OHV use. Emphasize public access to recreation sites, special use sites, and private land. Emphasize mgmt. access for ecosystem restoration and fire protection. Construct new roads to provide access to new recreation facilities, administrative sites, or research, or to replace roads producing impacts. Continue to request funds to reduce maintenance backlog and keep system in acceptable condition.
Alternative 6	Retain road access for both public and management use. Repair, relocate, close, or decommission roads to reduce impacts to natural resources. Road system available for recreational driving and OHV use. Emphasize public access to recreation sites, special use sites, and private land. Emphasize mgmt. access for ecosystem restoration and fire protection. Construct new roads to provide access to new recreation facilities, administrative sites, or research, or to replace roads producing impacts. Continue to request funds to reduce maintenance backlog and keep system in acceptable condition.
Modified Alternative 6	Retain road access for both public and management use. Repair, relocate, close, or decommission roads to reduce impacts to natural resources. Road system available for recreational driving and OHV use. Emphasize public access to recreation sites, special use sites, and private land. Emphasize mgmt. access for ecosystem restoration and fire protection. Construct new roads to provide access to new recreation facilities, administrative sites, or research, or to replace roads producing impacts. Continue to request funds to reduce maintenance backlog and keep system in acceptable condition.

III. Affected Environment

This section summarizes the existing environment that could be affected by implementing any of the alternatives. The most important resources are discussed in this summary. These and other resources are discussed in detail in Chapter III of the FEIS.

A. *Air Quality*

The primary impact to air quality in the Monument is from smoke. Smoke may result from forest fires or from prescribed burning. Smoke can degrade air quality and impact public health. Smoke is a contributor to ambient particles smaller than 10 microns in diameter (PM10) and ozone. The literature suggests that ambient particles of the greatest concern to health are those smaller than 10 microns in diameter (PM10). The air pollution control district where the Monument is located is considered to be in non-attainment (not meeting standards) federally for PM10 and Ozone.

B. *Fire and Fuels*

Fire is a natural disturbance and a key process in a healthy, functioning ecosystem. It has been an important ecological force in the Sierra Nevada for thousands of years. The majority of Monument lands support fire dependent ecosystems. Old forests of mixed conifer and ponderosa pine developed with much more frequent and low severity fires. Fire return intervals in the Monument have been altered through years of fire suppression. Over the last century, fire return intervals have been missed, leading to significant increases in surface, ladder, and crown fuels.

Fuel loading is a quantifiable measure of surface fuels in an area, usually expressed in tons per acre by size class. The average fuel loading in the Monument is from 44 tons per acre up to 104 tons per acre (values do not include the duff layer).

To quantify the shift of vegetation from a resilient fire dependent ecosystem to an ecosystem that is susceptible to wildfire, a fire susceptibility rating was developed for the forest. Acres with high fire susceptibility would, under high fire weather, contribute to stand-replacing fire. Approximately 30 percent of the land in the Monument is classified as high fire susceptibility. The giant sequoia groves are also at risk of catastrophic fire and do not meet desired conditions for the fire severity indicator.

Fire return interval describes how often fires occur in a particular location. A fire return interval departure index ranging from -16 to 1 was classified into five categories: extreme, high, moderate, low, and rock/water. Sixty-two percent of the Monument is classified as extreme fire return interval departure, where from 5 to 16 fire return cycles have been missed.

Wildland urban intermix (WUI) zones are areas where human habitation is mixed with areas of flammable wildland vegetation (USDA Forest Service, Pacific Southwest

Region, 2001). The WUI includes defense zones (approximately ¼-mile wide) and threat zones (approximately 1¼-mile wide), which are locally determined buffers defined by topographic features and predicted fire behavior. There are an estimated 26,635 acres of defense zone in the Monument and an estimated 182,000 acres of threat zone in the Monument.

C. *Giant Sequoia and Mixed Conifer*

Currently, much of the forested landscape is much more dense and has much more surface fuel than before 1875, which reduces the forest's resilience and stability and increases the risk of catastrophic wildfire. There are approximately 125,000 acres of mixed conifer or giant sequoia forest in the Monument. All of the groves and surrounding mixed conifer forests in the Monument have been affected to varying degrees by human activity, whether by the disruption of the fire return interval or by logging. From the 1960s until the mid-1980s, approximately 18,000 acres of plantations were created following harvesting. These plantations contain young trees that were established in openings much larger than openings or gaps created by fire, the dominant natural process that created openings prior to 1875.

There are 27,000 acres of giant sequoia in the Monument within 34 groves or grove complexes. A grove complex is a grouping of two or more groves in very close proximity to each other. Approximately 70% of the Monument grove acreage has been continuously protected from both fire and logging. The disruption of the natural fire regime, along with the elimination of any other large-scale disturbances, has led to a cessation of giant sequoia reproduction on this acreage (Harvey et al, 1980; Stephenson, 1996). The elimination of an historic fire regime has produced a more continuous forest cover structure, rather than a highly variable stand structure with a variety of gaps, patches, and age classes which were typical prior to 1875 (Piiro and Rogers, 1999). There has been a sustained and dramatic increase in shade-tolerant species such as white fir and incense cedar and a concurrent reduction in shade-intolerant, fire-dependent species such as giant sequoia and pines (sugar, Jeffrey, and ponderosa pines).

Twenty-five percent of the grove acreage has been logged but has had little or no prescribed fire. Of this 25%, the vast majority was logged near the turn of the 20th century and was concentrated in several groves (Converse, Grant, Indian Basin, and Big Stump) in the northern portion of the Monument. These harvested groves have re-vegetated with conifers and second-growth giant sequoias are a significant component of the stand composition. During the last 25 years, four percent of the grove acreage in the Monument has experienced disturbance from logging and subsequent burning for fuel reduction and site preparation, leading to the regeneration of giant sequoias, associated mixed conifer species, and other vegetation.

D. *Recreation*

The Monument offers a rich and varied range of recreation, interpretation, and education opportunities. The Sequoia and Kings Canyon National Parks border the

northern portion of the Monument and visitors to these parks often use Monument facilities. Visitation in the Monument was over 6 million visits based on the latest estimate in 1997.

Developed recreation facilities in the Monument include 21 family campgrounds and seven group campgrounds, six picnic areas, 22 trailheads, and approximately 160 miles of trails. A number of recreation facilities are located within giant sequoia groves, including four family campgrounds, one interpretive trail, five trailheads, and about 23 miles of trail.

In addition to developed recreation sites, the Monument is open to dispersed recreation. Dispersed recreation includes activities such as trail use, camping outside developed campgrounds, exploring back roads, fishing, hunting, cross country skiing, snowmobiling, sightseeing, whitewater rafting, off-highway vehicle use, nature study, and wildlife viewing.

Three resorts and nine organization camps, operated under special use permits, offer additional opportunities for forest visitors.

Several congressionally-designated areas are found entirely or partially within the Monument: the Monarch Wilderness, the Golden Trout Wilderness, the Kings Wild and Scenic River, the South Fork Kings Wild and Scenic River, the North Fork Kern Wild and Scenic River, and the Kings River Special Management Area.

E. Roads

Roads on national forest lands serve such needs as recreation, fire protection, vegetation management, commercial use, grazing, research, private property use, and insect and disease control. Most national forest visitors travel on the Forest Service road system. These roads provide access to millions of visitors every year.

s in the Monument. Most of the forest roads within the Monument were built primarily for timber harvesting between 1950 and 1980. Since that time, timber harvest levels, road construction, and road maintenance have declined. However, public use of the roads has increased about 3% per year, and pleasure driving is the single largest recreational use of lands managed by the Forest Service.

State and county roads provide access to the forest roads in the Monument, including State Highways 180, 190, and 155. Highway 180 is also a primary route serving Sequoia and Kings Canyon National Parks.

F. Socio-Economics

The San Joaquin Valley counties of Fresno, Tulare, and Kern are the areas of primary socio-economic effect of management decisions in the Monument. While all three counties enjoy some measure of tourist-related economic activity, much relating to national forest or parks, this is a relatively small proportion of the service and retail

sectors. The woods and mill jobs, while relatively small in number (about 100 in Tulare County), are more significant economically because they are not related to the needs of local residents as much as to the demand for products elsewhere.

The newly created Giant Sequoia National Monument is part of a larger natural and social ecosystem that has a relatively long history of conflict over public land management goals and practices. The uniqueness and limited range of giant sequoia trees only adds to the fervor with which people and groups have expressed their feelings. The Forest Service's traditional emphasis on timber production, road construction, and livestock grazing has shifted toward more recreation-based activities.

G. Watershed

The waters from the watersheds of the Monument all flow into the Tulare Lakebed. The Tulare Lakebed is located in the southern San Joaquin Valley about equidistant from the cities of Fresno and Bakersfield. Historically, the Tulare Lakebed received runoff from the Tule, Kaweah, Kern, and Kings Rivers, as well as other tributaries in these basins. There are 13 watersheds that are within these basins and at least partially within the Monument. Waters from the Monument provide a variety of beneficial uses, including municipal; agriculture; recreation; habitat for wildlife, fisheries, and rare species; and power generation.

H. Wildlife

Most early seral stage habitats in the Monument are minor inclusions within mature forest. The management indicator species associated with early seral stage habitats is mule deer. The deer population has been fairly stable at 30,000 to 40,000 animals in the past several years. Late seral, old growth (LSOG) forest conditions are important to a number of species, including the California spotted owl and pacific fisher. Current LSOG habitat occupies approximately 70,000 acres in the Monument. Hardwoods, primarily oaks, were identified as an ecosystem of particular concern in the Framework. There are approximately 124,000 acres of hardwoods, including shrub forms of oaks, blue oak woodlands, black oak woodlands, and mixed oak/conifer forests.

Several threatened, endangered, or sensitive wildlife species are found in the Monument, including California condor, bald eagle, Little Kern Golden Trout, northern goshawk, California spotted owl, pacific fisher, and great gray owl.

IV. Environmental Consequences

This section compares the alternatives by summarizing their environmental consequences, which are discussed in Chapter IV of the Monument DEIS in more detail.

A. *Air Quality*

Smoke from prescribed burning could affect air quality and is a concern because of its potential effects on human health and visibility. Fires emit large amounts of particulate matter (PM10 and PM2.5) and carbon monoxide, as well as nitrous oxide (NOx) and volatile organic compounds (VOCs), which are precursors to ozone. Emissions are based on the number of acres burned within an airshed. Reducing the total acreage burned, whether wildfire or prescribed fire, is the most effective way to reduce the total emissions within an airshed. Modified Alternative 6 has the lowest predicted total emissions in the short and long term.

B. *Fire and Fuels*

In the next 50 years, Modified Alternative 6 projects the fewest acres of stand-replacing fire compared to the other alternatives. Compared to the other alternatives, Alternatives 5, 6, and Modified 6 would reduce fire susceptibility and move toward historic fire return intervals the most in the first decade.

Modified Alternative 6 would use WUI defense and threat zones and SPLATs as part of its protection strategy from severe wildfires. Modified Alternative 6 would provide a greater degree of protection than all the other alternatives except Alternative 6.

C. *Giant Sequoia and Mixed Conifer*

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 risk of catastrophic fire is reduced to the groves. Alternatives 6 and Modified Alternative 6 would result in the most rapid implementation in the first two decades, followed by Alternatives 3, 4, and 5, and then Alternatives 1 and 2.

D. *Recreation*

Alternatives 2, 5, 6 and Modified 6 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 by 25 to 75%. Alternative 4 would encourage development of facilities and opportunities slightly less, and Alternatives 1 and 3 substantially less, than Alternatives 2, 5, 6, and Modified 6.

Alternatives 2, 5, 6 and Modified 6 would increase dispersed recreation opportunities for the public to use and explore lands in the Monument in a natural-appearing environment. Alternative 4 would increase dispersed recreation opportunities on trails but would reduce public road access for dispersed recreation by about 5%. Alternative 3 would increase dispersed recreation opportunities on trails but would reduce public road access for dispersed recreation by about 45%.

E. Roads

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 existing maintenance funding is not enough to fully maintain the existing roads in the Monument. 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.

The road system under Alternatives 1, 2, 5, 6 and Modified 6 would be comprised of approximately 900 miles of roads in the Monument. The maintenance strategy in these alternatives would require the greatest increase in funding (approximately 35%) to keep the road system in acceptable condition.

The road system under Alternative 3 would be comprised of approximately 755 miles of roads. 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.

The road system under Alternative 4 would be comprised of approximately 875 miles of roads within the Monument. 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.

F. Socio-Economics

There is no projected effect on the tourist-related employment in the service and retail sectors. 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.

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 in nearly 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.

G. Watershed

All alternatives would embrace the aquatic management strategy and the ecosystem management strategy presented in the Framework. The analysis shows that treatments proposed under all action alternatives would have similar effects on water quality and riparian resources. All alternatives are at or below the 5% threshold of concern (TOC) with the exception of Alternative 6, which is slightly above the 5% TOC level. 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 cumulative watershed effects would not occur.

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 cumulative watershed effects 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.

Alternatives 3 and 4 would include closing some of the existing road system to the public, maintaining some for administrative use and decommissioning some. 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.

H. Wildlife

All alternatives would create early seral stage habitat resulting from vegetation treatments in defense zones, threat zones, and restoration treatment areas. Wildfire would also create openings that would result in early seral stage habitat. The actual proportion of treated areas or fires resulting in patches of early seral stage habitat is unknown but expected to be low. Wildfires are likely to result in a higher proportion of acres in early stage seral habitat than areas treated with prescribed fire or mechanical treatments. Acres of vegetation treatment are estimated to be approximately 42,000 in Alternatives 1 and 2; 59,000 acres in Alternatives 3 and 4; 70,000 acres in Alternative 5; 79,000 acres in Alternative 6; and 64,000 acres in Modified Alternative 6.

Mature forest and large-tree-dominated habitats, and the number of large snags, would increase under all alternatives.

Areas modeled as meeting late seral old growth (LSOG) ranks 4 and 5 would increase from nearly 70,000 acres to approximately 180,000 acres under Alternative 5, and would increase to over 190,000 acres for Alternatives 1 and 2 (when projected out 150 years). Spotted owl nesting habitat would increase from approximately 48,500 acres to about 66,000 acres over the next 20 years.

Under Alternatives 3 and 4, the acres of LSOG ranks 4 and 5 would be projected to peak at just over 160,000 in 150 years. Spotted owl nesting habitat would increase from approximately 48,500 acres to about 68,000 acres over the next 20 years.

Under Alternative 6, LSOG ranks 4 and 5 acres would be projected to increase to 198,000 in 150 years. Spotted owl nesting habitat would increase from approximately 48,500 acres to about 63,000 acres over the next 20 years.

Under Modified Alternative 6, acres of LSOG ranks 4 and 5 would be projected to increase to 198,000 in 150 years. Spotted owl nesting habitat would increase from approximately 48,500 acres to about 63,000 acres over the next 20 years. Modified Alternative 6 incorporates additional management direction to protect old forest habitat, with a particular focus on protection of fisher habitat and populations.

All alternatives would 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.