

Chapter I

Purpose of and Need for Action

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I. Purpose of and Need for Action

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, Location Map). Created by Presidential Proclamation on April 15, 2000, the rich and varied landscape of the 327,769-acre 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 Monument provides exemplary opportunities for biologists, geologists, paleontologists, archaeologists, and historians to study its objects (see Appendix B, Proclamation).

The Monument Final Environmental Impact Statement (FEIS) presents six alternatives designed to manage the giant sequoias and other objects of interest. The management plan for the Monument will consist 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).

A. Purpose and Need

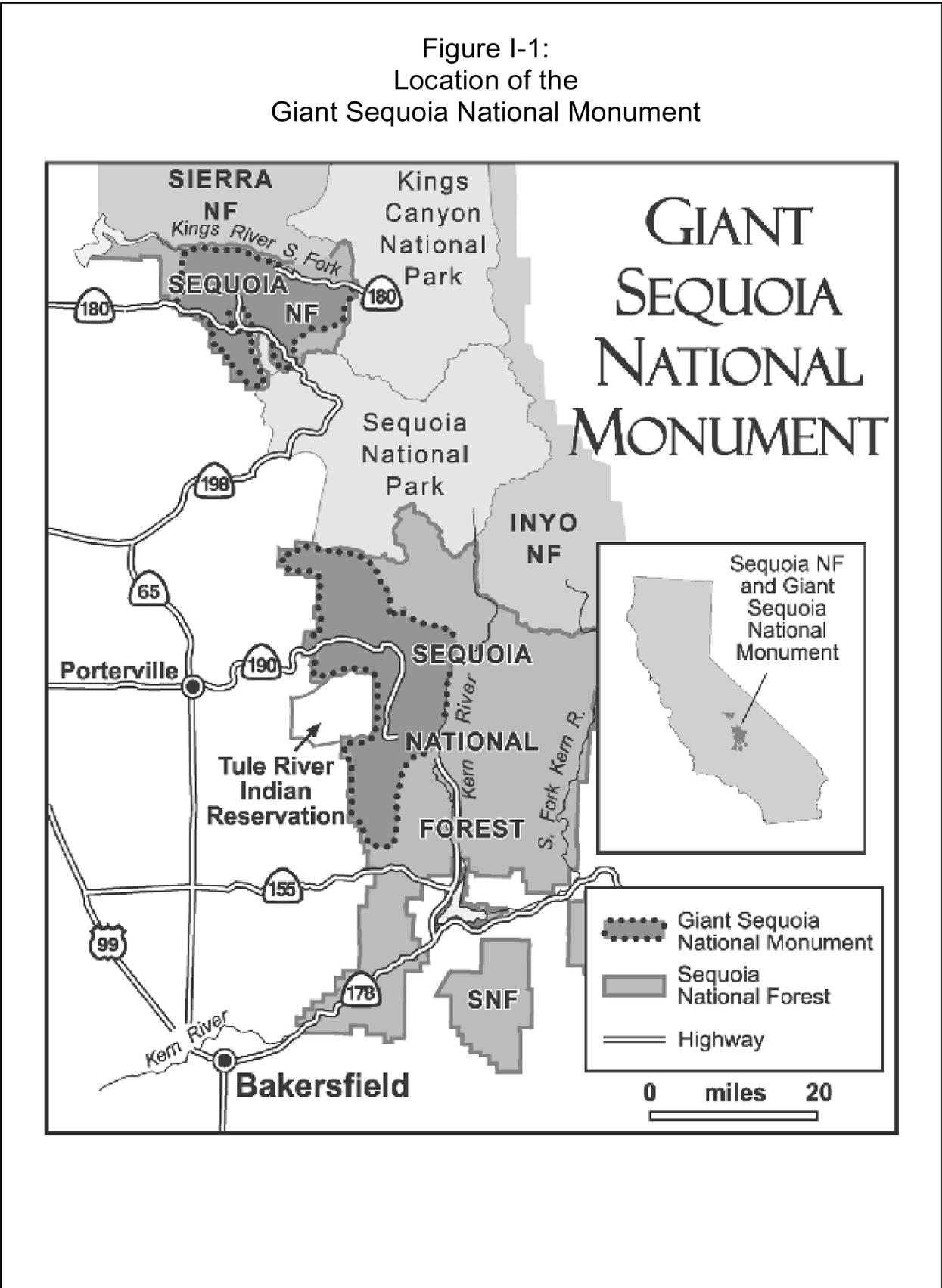
The Presidential Proclamation requires the preparation of a management plan for the Monument. The purpose of this management plan is to establish management direction for the land and resources within the Monument. It will amend the current Sequoia National Forest Land and Resource Management Plan (Forest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

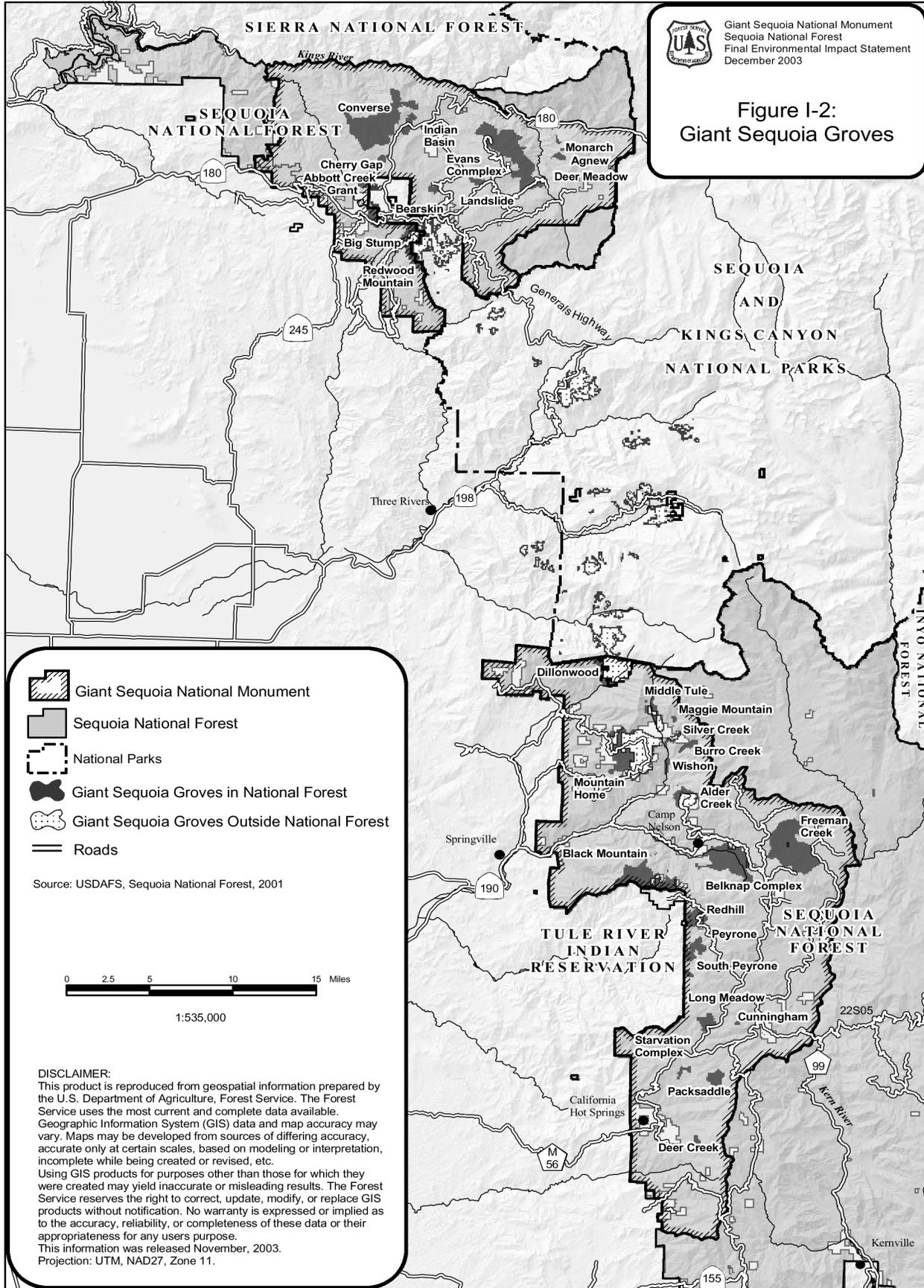
The Proclamation identified two critical problems facing the giant sequoias and their ecosystems: 1) an unprecedented failure in giant sequoia reproduction, and 2) an unprecedented buildup of woody debris and surface fuels, leading to an increased hazard from wildfires of a severity that was rarely encountered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

Figure I-1:
Location of the
Giant Sequoia National Monument





- 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.

B. Proposed Action

The proposed action is to amend the Forest Plan to provide management direction for the Monument. The proposed action was published in a Notice of Intent in the Federal Register and in the scoping letter, both dated June 8, 2001. Publication of the proposed action initiated the 45-day public scoping period and provided the public with an opportunity to comment on the initial thoughts regarding actions that might be taken.

The proposed action recommends the establishment of new or modified desired conditions and management goals for key resources in the Monument. To realize those desired conditions and meet those management goals, it also proposes the designation of new management areas (MAs) within the Monument, and their associated management emphases, standards, and guidelines.

The term “proposed action” is not synonymous with another term used in environmental impact statements, “preferred alternative.” Please see Chapter II, Alternatives Including the Proposed Action, for a full description of the proposed action (Alternative 2).

C. Decision to be Made

Given the purpose and need, the Responsible Official will review the proposed action, the other alternatives, and the environmental consequences in order to make the following decision:

- Whether to implement the proposed action, an alternative to the proposed action, or take no action at this time.

D. 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.

E. 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.

Public meetings on the proposal were held in Sacramento, Los Angeles, Clovis, Bakersfield, and Porterville, California from July 10 to July 16, 2001. At these meetings, the Monument planning team provided overviews of the proposed action, answered questions, discussed the timeline, and encouraged public comment.

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 to other agencies and interested publics to provide information on the development of the Monument management plan. They were mailed in December 2000, July 2001, and April 2002.

A web site for public access was made available with information on the monument management plan, the Board, and links to other sites regarding giant sequoias. The address is: 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. At these meetings, the monument planning team provided information on the development of alternatives for managing the Monument, answered questions, and encouraged 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; place-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 Comments.

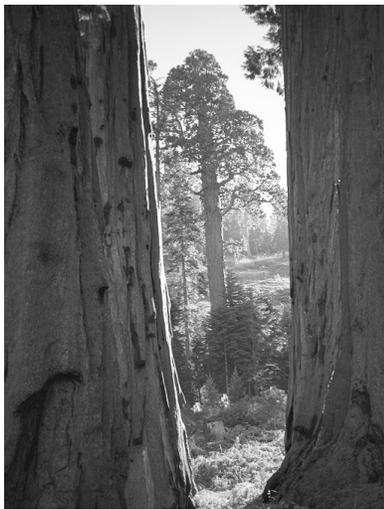
F. Desired Conditions

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. They are based upon: (1) the Proclamation creating the Monument, (2) Advisories from the Scientific Advisory Board, (3) the Sierra Nevada Forest Plan Amendment (Framework), and (4) public comments. The Desired Conditions are the same

for all action alternatives and are the vision for the management plan. Progress toward these desired conditions will vary by alternative, since each alternative varies by the pace, scope, and nature of its proposed management activities.

1. Giant Sequoia and the Surrounding Ecosystems.

The Proclamation describes the giant sequoia groves and conifer ecosystems as follows: “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. Ancestral forms of giant sequoia were a part of the western North American landscape for millions of years. 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 or more.



Because of this great longevity, giant sequoias hold within their tree rings multi-millennial records of past environmental changes such as climate, fire regimes, and consequent forest response. Only one other North American tree species, the high-elevation bristlecone pine of the desert mountain ranges east of the Sierra Nevada, holds such lengthy and detailed chronologies of past changes and events.

Sequoias and their surrounding ecosystems provide a context for understanding ongoing environmental changes. For example, a century of fire exclusion has led to an unprecedented failure in sequoia reproduction in otherwise undisturbed groves. Climatic change also has influenced the sequoia groves; their present highly disjunct distribution is at least partly due to generally higher summertime temperatures and prolonged summer droughts in California from about 10,000 to 4,500 years ago. During that period, sequoias were rarer than today. Only following a slight cooling and shortening of summer droughts, about 4,500 years ago, has the sequoia been able to spread and create today's groves (Appendix B).”

In order to preserve, protect, and restore the giant sequoia ecosystem as envisioned in the Proclamation, the Scientific Advisory Board recommended: “The overriding desired condition for vegetation is one that exhibits both stability and resilience, while best maintaining native biodiversity. That is, the overriding goal for vegetation is the ability to resist stressors (stability) and to recover from stresses once they occur (resilience). The presidential proclamation itself speaks of ‘restoring natural forest resilience’ in the Monument. For the near future and because environmental conditions have not yet deviated radically from pre-1875 conditions, the goal of restoring stability and resilience can be met by using pre-1875 mosaic of vegetation as a reference (Stephenson 1996). For example, many forested areas of the Monument are more dense and have much more surface fuel now than in pre-1875 times. Restoring pre-1875 forest densities and fuel loads would make these forests more stable (e.g., resistant to being severely altered by wildfire, droughts, pathogen outbreaks, or air pollution) and more resilient (more able to rebound from such stressors when they occur) (Appendix C, Advisory III).”

Based on the Proclamation and the work of the Scientific Advisory Board, 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. Fires will occur frequently at low intensity, in contrast to current catastrophic wildfires. In the long term, fire will be the primary management tool for maintaining and sustaining ecosystems, although mechanical treatments will be used in some instances. 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.

On-the-ground decisions will be guided by sound ecological principles and supported by current science. Ecosystems will be protected, preserved, and restored using methods acceptable to the public. These methods will include natural events, such as wildland fires and new growth from naturally seeding, or management actions, such as prescribed fires and campground maintenance. There will be consensus among managers and users that progress is being made toward helping nature speed recovery where contemporary human actions or inactions have interfered with natural processes.



The Confederate Grove in Yosemite National Park, about 1890.



A patch of established young conifers in the Sequoia and Kings Canyon National Parks (National Park Service photo).

2. Fire and Fuels.

The Proclamation described current forest structure and fuel conditions as follows: “Fire suppression has caused forests to become denser in many areas, with increased dominance of shade-tolerant species. Woody debris has accumulated, causing an unprecedented buildup of surface fuels. One of the most immediate consequences of these changes is an increased hazard of wildfires of a severity that was rarely encountered in pre-Euroamerican times. Outstanding opportunities exist for studying the consequences of different approaches to mitigating these conditions and restoring natural forest resilience (Appendix B).”

As recommended by the Scientific Advisory Board, the structural conditions and timing, intensity, and frequency of processes that existed prior to 1875 will be used as reference conditions. That period exhibited a fire regime with frequent fire return intervals, resulting in low risk for large, catastrophic fires as well as a highly diverse vegetation mosaic of age classes, tree sizes, and species composition. Under those conditions, fires will generally be low intensity and occur frequently across the landscape (currently many wildfires create catastrophic effects such as severe mortality in trees and degraded watershed conditions).

“The highest priority has been given to fuel reduction activities in the urban wildland intermix zone. Fuel reduction treatments protect human communities from wildland fires as well as minimize the spread of fires that might originate in urban areas. Fire suppression capabilities are enhanced by modified fire behavior inside the zone (USDA Forest Service, January 2001, Record of Decision, page 9).”



Home surrounded by dense, highly flammable vegetation.

Accordingly, the desired condition for wildland urban intermix follows the Framework guidelines: “The highest density and intensity of treatments [have been] in developed areas within the wildland urban intermix zones. Fuel treatments have increased the efficiency of firefighting efforts and reduced risks to firefighters, the public, facilities and structures, and natural resources. Fuel treatments provide a buffer between developed areas and wildlands. Fuel conditions allow for efficient and safe suppression of all wildland fire ignitions. Fires are controlled through initial attack under all but the most severe weather conditions.

Under high fire weather conditions, wildland fire behavior in treated areas is characterized as follows: 1) flame lengths at the head of the fire are less than four feet, 2) the rate of spread at the head of the fire is reduced to at least 50 percent of pre-treatment levels for a minimum of five years, 3) hazards to firefighters are reduced by keeping snag levels to two per acre (outside of California spotted owl and northern goshawk protected activity centers and forest carnivore den site buffers), and 4) production rates for fire line construction are doubled from pre-treatment levels (USDA Forest Service, January 2001, Record of Decision, page 9).”



A low-intensity fire.

3. Wildlife Habitat.

The Proclamation describes habitats as follows: “The great elevational range of the monument embraces a number of climatic zones, providing habitats for an extraordinary diversity of plant species and communities. The monument is rich in rare plants and is home to more than 200 plant species endemic to the southern Sierra Nevada mountain range, arrayed in plant communities ranging from low-elevation oak woodlands and chaparral to high-elevation subalpine forest. Numerous meadows and streams provide an interconnected web of habitats for moisture-loving species.

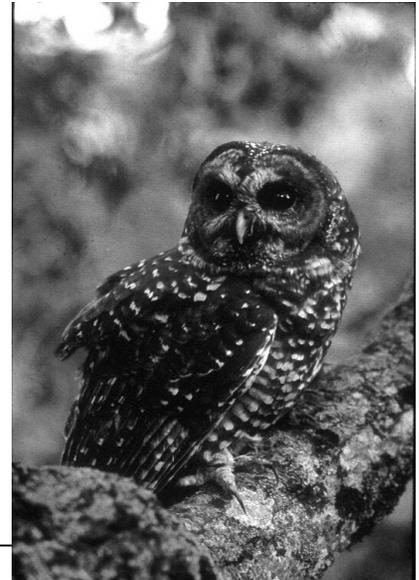
This spectrum of interconnected vegetation types provides essential habitat for wildlife, ranging from large, charismatic animals to less visible and less familiar forms of life, such as fungi and insects. The mid-elevation forests are dominated by massive conifers arrayed in a complex landscape mosaic, providing one of the last refugia for the Pacific fisher in California. The forests of the Monument are also home to the great gray owl, American marten, northern goshawk, peregrine falcon, spotted owl, and a number of rare amphibians (Appendix B).”

The Scientific Advisory Board recommends that: “The Monument should follow current and future research on the relationships between LSOG[Late Seral/Old Growth]-correlated species and stand-structure modification, as well as grazing. Direct monitoring of sensitive LSOG species, not merely monitoring of habitat, is called for until those relationships are better understood (Appendix C, Advisory XII).”

Accordingly, the desired condition is that the habitat in the Monument will continue to contribute substantially to the long-term viability of habitat and 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. Within each watershed, a minimum of 50 percent of the mature forested area is at least travel or foraging quality fisher habitat, and at least an additional 20 percent is resting or denning quality habitat (USDA Forest Service, January 2001, Record of Decision, page 8).”



Pacific fisher (CA Fish & Game photo)



California spotted owl

4. Dispersed and Developed Recreation.

The Proclamation describes human use of the Monument as follows: “The plan will provide for and encourage continued public and recreational access and use consistent with the purposes of the monument...The management plan shall contain a transportation plan for the monument that provides for visitor enjoyment and understanding about the scientific and historic objects in the monument, consistent with their protection (Appendix B).”

To meet the vision of the Proclamation, the Scientific Advisory Board advises that: “The Plan should take into account substantial increases in visitor use and exploit opportunities for collaboration with nearby communities and businesses plus the National Park[s]...[It] needs to include a plan to develop good quantitative and qualitative information on visitor use, activities undertaken, and enjoyment of proposed interpretive programs and facilities to comply with the Presidential Proclamation (Appendix C, Advisories XVII and XIX).”

Accordingly, the desired condition for human use of the Monument is as follows: 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.



A hiking trail winds its way around a monarch giant sequoia in Long Meadow Grove.



The trailhead for the popular Trail of a Hundred Giants.



A typical developed campsite.

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. Un-interpreted "discoveries" will be available to those who seek adventure through individual exploration. Opportunities will be available for solitude, inspiration, and spiritual renewal.



The Needles Lookout

There will be consensus among managers and users that recreation uses and developments are well balanced and conflicts are resolved fairly. Special attention will be given to the protection of unusual or outstanding grove features, as these features have great social and recreational values.



Interpretive program in a giant sequoia grove.

5. Historic and Prehistoric Resources.

About historic and prehistoric resources, the Proclamation tells us: “During the past 8,000 years, Native American peoples of the Sierra Nevada have lived by hunting and fishing, gathering, and trading with other people throughout the region. Archaeological sites such as lithic scatters, food-processing sites, rock shelters, village sites, petroglyphs, and pictographs are found in the monument. These sites have the potential to shed light on the roles of prehistoric peoples, including the role they played in shaping the ecosystems on which they depended.”

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 these objects (Appendix B).”

In order to protect and preserve the historic and prehistoric resources as cited in the Proclamation, the desired condition is described as follows: 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.



The Hume Lake Dam has been nominated as a National Historic Landmark.

6. Transportation System.

The Proclamation tells us: “The management plan shall contain a transportation plan for the monument that provides for visitor enjoyment and understanding about the scientific and historic objects in the monument, consistent with their protection. For the purposes of protecting the objects included in the monument, motorized vehicle use will be permitted only on designated roads, and non-motorized mechanized vehicle use will be permitted only on designated roads and trails, except for emergency or authorized administrative purposes or to provide access for persons with disabilities. No new roads or trails will be authorized within the monument except to further the purposes of the monument (Appendix B).”

In order to implement the vision of the Proclamation, the Scientific Advisory Board advises: “The range of alternatives in developing the transportation component of the management plan should include a public transportation alternative for the most heavily used areas of the Monument. The plan should take into account substantial increases in visitor use and exploit opportunities for collaboration with nearby communities and businesses plus the National Park. Basic research on the Giant Sequoias and transportation-related impacts should be conducted (Appendix C, Advisory XVII).”

Accordingly, the desired condition is that 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. Mass transportation options will be phased in if demand for this type of service supports an economically feasible system.



7. Caves.

The Proclamation describes caves and other special geologic resources as follows: “The monument is dominated by granitic rocks, most noticeable as domes and spires in areas such as the Needles. The magnificent Kern Canyon forms the eastern boundary of the monument's southern unit...Particularly in the northern unit of the monument, limestone outcrops, remnants of an ancient seabed, are noted for their caves. Subfossil vegetation entombed within ancient woodrat middens in these caves has provided the only direct evidence of where giant sequoias grew during the Pleistocene Era, and documents substantial vegetation changes over the last 50,000 or more years. Vertebrate fossils also have been found within the middens (Appendix B).”

To realize the vision described in the Proclamation, the desired condition is that 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.



View from the trail to Boyden Cavern.

8. Scientific Study.

The Proclamation describes the promise of science as follows: “The rich and varied landscape of the Giant Sequoia National Monument holds a diverse array of scientific and historic resources...The monument provides exemplary opportunities for biologists, geologists, paleontologists, archaeologists, and historians to study these objects...These giant sequoia groves and the surrounding forest provide an excellent opportunity to understand the consequences of different approaches to forest restoration...Outstanding opportunities exist for studying the consequences of different approaches to mitigating these conditions and restoring natural forest resilience...Outstanding opportunities exist for studying forest resilience to large-scale logging and the consequences of different approaches to forest restoration (Appendix B).”



Areas such as this portion of the Black Mountain Grove were harvested in the 1980s and now contain young giant sequoias. These areas offer opportunities to study the ecological effects of such practices.

To realize the promise of science, the desired condition is that management of the resources in the 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.



The Scientific Advisory Board assisted with development of the management plan for the Monument.

Studies of fire scars and other ecological “clues” will continue to provide greater understanding of the important ecological processes and characteristics that are important to long-term sustainability and protection of the Monument.



G. Issues

Following the end of the public scoping period, comments and concerns were separated into two groups: non-significant and significant issues. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, or other higher-level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. Significant issues were defined as such because of their relevance to the decision to be made, the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflict. They were established by the Forest Supervisor. Significant issues are used to develop alternatives, determine what mitigation or constraints are needed, and help focus the analysis. The Council of Environmental Quality National Environmental Policy Act (NEPA) regulations explain this delineation in Sec. 1501.7: “...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)...” A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project file on record at the Sequoia National Forest Supervisors Office in Porterville, CA.

The following are the significant issues identified after scoping that were used to develop alternatives and focus the analysis, and that will be analyzed throughout this document. Indicators are presented with each issue; they will be used in the analysis to measure change relating to that issue in each alternative.

1. Air Quality

Issue: Prescribed burning may increase short-term smoke emissions and impact public health.

Background Information: The San Joaquin Valley Air Basin is classified as a serious non-attainment area for the health-based National Ambient Air Quality Standards for particulate matter with an aerodynamic diameter of 10 microns or less (PM-10). Smoke from wildfires and prescribed burns contributes PM-10 to the air.

The Giant Sequoia National Monument will inevitably contribute smoke to the Basin, regardless of management approach. At one extreme, if no forest restoration efforts are undertaken and all fires are fought aggressively, the Basin will still experience episodes of moderate to extreme smoke from wildfires that inevitably escape control and burn through dense, unrestored, fire-prone forest. On the other hand, management actions that restore forests to a condition that is less prone to uncontrollable wildfires, whether those actions emphasize prescribed fire or mechanical means, will also produce smoke. Prescribed fire inevitably produces smoke, though the timing and quantity are much more controllable than that produced by wildfires. Prescribed burning may decrease long-term smoke emissions by reducing the quantity and intensity of wildfires. Additionally, mechanical approaches to forest restoration can contribute to PM-10 through increased dust production, though this contribution is probably minor relative to that of smoke.

Indicators:

1. PM-10 emissions (tons) generated by underburning and pile burning in the first decade.

2. Fire and Fuels

Issue: 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.

Background Information: 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. Changes to the historic fire regime can have significant effects on landscape patterns of vegetation and fuels and, as a result, fire behavior. As throughout the Sierra Nevada, fire return intervals in the Giant Sequoia National

Monument have been altered through years of fire exclusion. Over the last century, fire return intervals have been missed, leading to significant increases in surface, ladder, and crown fuels. The result is an increased potential for uncharacteristically severe wildfires. These large, severe fires affect the vegetation differently than the frequent, less severe fires, changing the pattern over the landscape and, in turn, affect the cycles of fuel accumulation and fire. The Framework's approach to fuel reduction locates fuel treatments across broad landscapes that are linked to support one another so that the spread of wildland fire is interrupted and its intensity reduced. These strategies are intended to protect the resources found in the Monument, including life, property, and sensitive resources such as the giant sequoias, wildlife, and riparian areas.

Indicators:

1. Acres treated to move the fire susceptibility rating from moderate or high toward low.
2. Acres treated to move toward historic fire return intervals.

3. Giant Sequoia

Issue: 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.

Background Information: The desired condition is to re-establish natural processes and structural conditions that allow the giant sequoia and their mixed conifer ecosystems to be both stable and resilient to environmental change. The conditions that existed prior to 1875 are used as a reference. This period exhibited a fire regime of frequent and generally low-intensity fires. This fire regime helped promote a high degree of vegetative diversity and a low risk of catastrophic fire. The fires created openings in the forest canopy and a mosaic of vegetative age and size classes that led to the successful establishment and recruitment of young giant sequoias.

For giant sequoia seedlings to become established and grow successfully, openings need to be created with no significant competition for light and soil nutrients from other vegetation. These conditions may be achieved by using prescribed fire methods only. However, under certain conditions, mechanical methods may be more desirable. These conditions include: 1) in the Southern Sierra Fisher Conservation Area allocation, where mechanical treatment is emphasized over prescribed fire; 2) in the Old Forest Emphasis allocation, where prescribed fire use in proximity to special resource values and private property, or extreme fuel conditions, may represent an unacceptable risk by using prescribed fire alone; and 3) where the existing fuel loads in giant sequoia groves are so heavy that mechanical or hand treatments are desirable prior to re-introducing fire. When using mechanical methods, the standards and guidelines prescribed by the Framework constrain reductions in the canopy cover to establish desired fire behavior

outcomes (flame lengths and live crown base heights) and constrain the size of trees that can be purposefully removed by mechanical methods.

Indicators:

1. The amount of predicted change in conditions and trends to the following key ecological indicators (Pirto and Rogers, 1999) as compared to the desired condition: gap and patch size, plant community, risk from severe fires, and fire return interval. The last two indicators are also discussed under Fire and Fuels.

4. Mixed Conifer Restoration

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

Background Information: Fire is a natural disturbance and a key process in sustaining a healthy, functioning ecosystem. It has been an important ecological force in the Sierra Nevada for thousands of years. Changes to the historic fire regime have had significant effects on landscape patterns of vegetation and fuels and, as a result, fire behavior. The result is an increased potential for uncharacteristically severe wildfires. These large, severe fires affect the vegetation differently than the frequent, less severe fires, changing the pattern over the landscape and, in turn, affect the cycles of fuel accumulation and fire.

The desired condition is to re-establish natural processes and structural conditions that allow the mixed conifer ecosystem to be both stable and resilient to environmental change. The conditions that existed prior to 1875 are used as a reference. This period exhibited a fire regime of frequent and generally low-intensity fires. This fire regime helped promote a high degree of vegetation diversity and a low risk of catastrophic fire.

While using prescribed fire methods are preferred, under certain conditions, mechanical methods may be more desirable. According to the Framework, these conditions include: 1) in the Southern Sierra Fisher Conservation Area allocation, where mechanical treatment is emphasized over prescribed fire; 2) in the Old Forest Emphasis allocation, where prescribed fire use in proximity to special resource values and private property may represent an unacceptable risk by using prescribed fire alone; and 3) where the existing fuel loads are so heavy that mechanical or hand treatments are desirable prior to re-introducing fire. When using mechanical methods, the standards and guidelines prescribed by the Framework constrain reductions in the canopy cover to establish desired fire behavior outcomes (flame lengths and live crown base heights) and constrain the size of trees that can be purposefully removed by mechanical methods.

The Framework's strategies to reduce fuels, reduce the risk of catastrophic fire, and protect late seral old growth habitat may not restore the ecosystem to the desired condition in the Giant Sequoia National Monument. The effectiveness of the Framework strategies to restore the desired condition of a more natural fire regime and vegetative stand structure are uncertain.

Indicators:

1. 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: gap and patch size, plant community, risk from severe fires, and fire return interval. The last two indicators are also discussed under Fire and Fuels.

5. Recreation

Issue: 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.

Background Information: Changes in the level of development may be needed to meet public demand for a wide range of high quality opportunities for recreation, interpretation, and education within the Monument. Many people believe the Monument should provide more developed recreation, interpretation, and educational experiences. Other people think the Monument should provide dispersed and, some would say, more natural opportunities for recreation, interpretation, and education, with fewer developed facilities.

Indicators:

1. Change in People at One Time (PAOTs) that can be served by recreational, interpretive, and educational facilities.
2. Estimated capacity of dispersed recreation areas or concentrated use areas (CUAs).
3. Predicted mileage of roads and trails available for public use.

6. Social Values Regarding Vegetation Treatments

Issue: 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. The expectations and beliefs of some people that the Monument will not be managed in the spirit of the Proclamation are based on a lack of trust.

Background Information: There is debate over what management activities are appropriate in the Monument and in the giant sequoia groves, such as the use of mechanical equipment (ground-based heavy equipment), prescribed fire, or handwork. Reaching the desired conditions of historic stand structures, historic fire regimes, and protecting the objects of interest, especially giant sequoias, may be a positive goal widely agreed to, but some of the different methods to reach the desired outcomes may be unacceptable to some.

Expectations, values, and beliefs vary by individual and are difficult to measure. Some people want more active management, including mechanical treatments, to restore the Monument and reduce catastrophic fire risk, while others want only fire to be used to reach these goals. Some people believe the cost of restoration and fuel treatments should be partially offset by the sale of wood products that result from those treatments, while others feel that the use of mechanical methods and the sale of wood products are contrary to appropriate management of the Monument. Therefore, indicators to measure the difference between alternatives for this issue are the volume of wood products resulting from restoration and protection treatments (that could be available for sale) and the acres of mechanical treatments per year.

Indicators:

1. Wood products available from protection and restoration treatments.
2. Acres of mechanical treatments per year.

7. Watershed

Issue: 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, riparian health, soil and water resources, and beneficial uses. These effects may include accelerated erosion, sedimentation, increased nutrient loading, and decreased stream stability and aquatic habitat.

Background Information: The Monument contains multiple watersheds, the waters of which support numerous beneficial uses, both inside and outside of Monument boundaries. The combined effects of past management activities, urbanization, fuels reduction direction in the Framework, and restoration activities for protection of the giant sequoia groves and their ecosystems have the potential to adversely impact Monument watersheds. Campgrounds, roads, and other facilities in subwatersheds or landscapes with a high density of past, present, and proposed management activities add to the potential for cumulative effects.

Large, severe wildfires can have negative effects on watersheds, riparian health, soil and water resources, and beneficial uses. The effects of these catastrophic fires can add to the potential for cumulative effects, even in the absence of management activities.

Indicators:

1. Acres in the Monument with a prescription that would move the fire susceptibility rating toward low and reduce potential cumulative effects from catastrophic wildfire.
2. Potential risk of cumulative effects within the total acres of watersheds that contain Monument lands:
 - a. Percent of ground-based treatment
 - b. Percent of non-ground-based treatment (burning)
 - c. Total system road miles open for public use

8. Wildlife

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

Background Information: The Framework described effects to LSOG-dependent species based on certain fuel treatment priorities and delineations associated with urban intermix zones. The proposed action for the Monument management plan proposes vegetation treatments to protect and restore the giant sequoia groves. The treatments proposed may include fuels treatments and silvicultural treatments in LSOG areas. The Monument provides habitat for a wide range of important wildlife species that are dependent on LSOG habitat. Sensitive species of concern include the California spotted owl, the American marten, and the Pacific fisher.

Indicators:

1. Predicted change in acres of late seral/old growth habitat (as defined in the Sierra Nevada Ecosystem Report).