

Summary

The Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement (FEIS) presents nine different alternatives for stewardship of national forests in the Sierra Nevada and Modoc Plateau. These alternatives aim to:

- sustain old forest ecosystems;
- protect and restore aquatic, riparian, and meadow ecosystems;
- improve fire and fuels management;
- combat noxious weeds; and
- sustain lower westside hardwood ecosystems.

The alternatives describe different possibilities for amending the land and resource management plans for the Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sequoia, Sierra, and Inyo National Forests in California, the Lake Tahoe Basin Management Unit, and the portion of the Humboldt-Toiyabe National Forest in the Sierra Nevada. The alternatives would also amend Regional Guides for the Intermountain and Pacific Southwest Regions. The alternatives include two preferred alternatives and a no action alternative. The FEIS describes and discloses the expected environmental consequences of the eight alternatives considered.

Background

This FEIS has its origins in work done over the last decade to protect the California spotted owl. Several documents and reports mark the key steps in improving spotted owl habitat conservation. Early research on status and viability of the California spotted owl (Verner and others 1992) showed that certain owl populations were at risk. Interim management guidelines to protect California spotted owl populations were recommended until a more comprehensive management plan could be developed. An environmental assessment was prepared for these interim guidelines, which are commonly known as the CASPO guidelines, and a Decision Notice was issued on January 13, 1993.

A draft environmental impact statement (DEIS) for conservation of California spotted owl habitat was prepared in 1995. However, significant new information was identified during the public comment period on that DEIS. Therefore, a revised draft EIS (RDEIS) was developed and scheduled for release in summer 1996. As the date for release neared, the Secretary of Agriculture halted release pending a science review, and then chartered a Federal Advisory Committee in May 1997. The charter to the Federal Advisory Committee was to review the RDEIS to consider whether it adequately integrated and analyzed recently available information significant to national forest management in the Sierra Nevada, namely new information in the Sierra Nevada Ecosystem Project (SNEP) reports being released at about the same time as the RDEIS was scheduled for release. The Federal Advisory Committee concluded its work in fall 1997, and found that the California Spotted Owl RDEIS was insufficient, either as a California spotted owl habitat management plan or as a broader ecosystem management plan (FAC 1997). The findings of the Federal Advisory Committee were significantly influenced by the SNEP reports submitted to Congress beginning in June 1996.

In addition to the Federal Advisory Committee, the US Senate Subcommittee on Forest and Public Land Management and the House Subcommittee on Forests, requested formation of the California

Forest EIS Review Committee. This new committee's charge was to examine whether the California Spotted Owl RDEIS was a scientifically sound and complete document, whether it had considered all sources of relevant information, and whether there was scientific justification for the withdrawal or suspension of the RDEIS. In September 1997, the California Forest EIS Review Committee released a draft report finding that the RDEIS had indeed reviewed all relevant information available at the time, and that it had followed appropriate procedures, including adequate use of modeling techniques and databases. In May 1998, the California Forest EIS Review Committee released its final report affirming findings reported in its draft.

In response to the Federal Advisory Committee's report to the Secretary of Agriculture on November 13, 1997, the Chief of the Forest Service instructed the Regional Forester for the Pacific Southwest Region and the Station Director for the Pacific Southwest Research Station to "significantly improve the conservation strategy (for California spotted owls and all forest resources) through strong collaboration with partners and researchers." Chief Mike Dombek further directed that "The strategy will stand on the solid foundation of the best available science. Our goal is to ensure the ecological sustainability of the entire Sierra Nevada ecosystem and the communities that depend on it." This FEIS addresses how national forests in the Sierra Nevada and Modoc Plateau can contribute to the broad goal of ecosystem sustainability, a goal that requires actions of agencies and individuals beyond the Forest Service for success.

The Forest Service engaged potential collaborators in discussions and convened an open public meeting with those potential collaborators from other Federal, State, County and Tribal governments in Sacramento, California, on February 26, 1998. Interest was high but commitments for collaborative planning were weak. On May 1, 1998, the Regional Forester in the Pacific Southwest Region issued a letter of instruction to Forest Supervisors in the Sierra Nevada that identified 4 tasks for "Improving conservation options for national forests in the Sierra Nevada."

Task 1 was the May 1 letter itself that clarified existing guidelines for habitat management and identified a process for obtaining review of projects that deviated from those guidelines. It also disclosed the key resources at issue in improving conservation options: old forests and their associated species, roadless areas, riparian and aquatic ecosystems, and fire and fuels management. Science reviews and public meetings subsequent to the May 1 letter would eventually modify these resource issues into the Problem Areas identified in this FEIS.

Task 2 was a science review to inform the plan amendment process. It was underway when the May 1 letter was issued.

Task 3 was the plan amendment process represented by this FEIS.

Task 4 outlined the broader goals of a long-range conservation framework to be developed in collaboration with other agencies and the public, what is now known as the Sierra Nevada Framework for Conservation and Collaboration.

Task 3 of the May 1, 1998 letter, the plan amendment EIS process, is but a part of the larger Framework, which is ongoing and will continue beyond the Record of Decision for this EIS. The Framework has two fundamental principles:

- science-based conservation, bringing the best available science to bear on understanding challenging problems and
- collaborative problem solving, working with others to design, implement, and monitor conservation policy, programs, and actions that will sustain desired environmental, economic and social conditions in the Sierra Nevada to meet the needs of people both now and in the future.

In July 1998, the USDA Forest Service Pacific Southwest Research Station, published the Sierra Nevada Science Review (USDA Forest Service, 1998c) synthesizing current scientific information concerning issues of urgent priority at the Sierra Nevada range-wide scale. A companion document, the Summary of Existing Management Direction, was released in August 1998 (USDA Forest Service, 1998b). This report summarized current management direction related to issues identified in the Science Review. These documents provided background information useful to understanding the relationship between existing forest plans, social and economic values, and environmental trends in the Sierra Nevada.

On July 10, 1998, the Regional Foresters of Forest Service Pacific Southwest and Intermountain Regions committed to develop new management direction for national forests in the Sierra Nevada and Modoc Plateau to address five urgent problem areas with range wide significance (Federal Register, July 10, 1998), recognizing a clear need to update existing national forest land and resource management plans to provide consistent, scientifically current management direction.

The Purpose of and Need for Action

The purpose and need for this action is to address five problem areas:

- old forest ecosystems and associated species;
- aquatic, riparian, and meadow ecosystems and associated species;
- fire and fuels management;
- noxious weeds; and
- lower westside hardwood forest ecosystems.

These five problem areas are considered to need urgent attention at the Sierra range-wide scale because:

1. there is new scientific information about the extent, intensity, and duration of the problem;
2. the problem occurs at broad geographic scales;
3. environmental risk, as judged by concerns raised from the public or science community, indicate that action to address the problem should be taken now; or
4. the problem is not addressed well elsewhere.

Old Forest Ecosystems and Associated Species

Old forest ecosystems provide critical habitat for a host of plant and animal species and they perform important ecological functions. Old forests are one of the most altered ecosystems in the Sierra Nevada (SNEP 1996a). Certain species known to be closely associated with or dependent upon old

forest ecosystems are thought to have declined, including the California spotted owl, Pacific fisher, and American marten.

The purpose of the proposed action is to protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve their associated species while meeting people's needs for commodities and outdoor recreation opportunities. Specifically, the desired goal is to increase the density of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across national forest landscapes. This will include reversing declining trends in abundance of old forest ecosystems and habitats for species that use old forests.

Aquatic, Riparian, and Meadow Ecosystems

The condition of aquatic, riparian, and meadow ecosystems directly affects the quantity, quality, and timing of stream flows. There is a strong desire from the public for national forests to produce clean water to meet needs for domestic, agricultural, and recreational uses. The public also values aquatic, riparian, and meadow ecosystems for the grazing, recreation, and other uses they provide. One of the critical findings in the SNEP Report is that these ecosystems are the most degraded of all habitats in the Sierra Nevada, though much of the degradation is attributed to lower elevation dams and diversions. Aquatic, riparian, and meadow ecosystems are the most degraded of all habitats in the Sierra Nevada. Many aquatic and riparian-dependent species (such as willow flycatcher, foothill and mountain yellow-legged frog, California red-legged frog, Cascade frog, Northern leopard frog, and Yosemite toad) and communities are at risk of extirpation.

The purpose of the proposed action is to protect and restore desired conditions of aquatic, riparian and meadow ecosystems in Sierra Nevada national forests. Consistent regional direction is needed to provide for proper functioning of key ecosystem processes, such as nutrient cycling, continued supplies of high quality water, maintenance of biological diversity, and viability of species associated with these ecosystems. This direction includes improving existing conservation programs, strategies, and practices, and providing a consistent assessment of watershed condition.

Fire and Fuels

Wildland fire is a major threat to life, property, financial resources, and natural resources and a critical natural process in the Sierra Nevada. The recent history of fire in the Sierra Nevada has alerted the public, elected representatives, and land management agencies to the hazard posed by wildland fires. There is a need to reduce the wildfire threat to human communities and natural resources, maintain ecosystem functions, and decrease the cost of fire suppression.

The human population in the Sierra Nevada doubled between 1970 and 1990. The 1990 population is expected to triple by 2040. This has put increasing numbers of people and communities “in harm’s way,” at risk of loss from wildfires unless hazards are mitigated. .

The purpose of the proposed action is to:

- bring greater consistency in fire and fuels management across the national forests, and coordinate management strategies with other ownerships and other Forest Service resource management objectives,

- adjust the goals and objectives in national forest land management plan direction to reflect the role and consequence of wildland fire and to achieve consistency with the Federal Wildland Fire Management Policy, adopted by the Forest Service in 1996, and
- set priorities for fire management actions to balance the need to restore fire as a key ecosystem process while minimizing the threat fire poses to structures, lives, and resources.

Noxious Weeds

There is a rapid spread of invasive, exotic plant species that threatens to crowd out native plants and compromise wildland values. Noxious weeds, such as yellow star thistle and scotch broom are expanding throughout California and gaining ground in the Sierra Nevada. Forest plans need to incorporate the noxious weed direction that was added to the Forest Service Manual (USDA Forest Service 1995a) in 1995.

The purpose of the proposed action is to provide a strategy, with standards and guidelines, to reduce the rapid spread of invasive exotic plant species, to contain existing weed populations, and where possible to eradicate them.

Lower Westside Hardwood Forest Ecosystems

Lower westside hardwood forest ecosystems, although limited in extent on Sierra Nevada national forest lands, are extremely important for biodiversity, visual quality, commodity based resources, American Indian cultural uses, and for their roles in ecological processes such as fire, soil building, and nutrient cycling. Traditionally, management of hardwood ecosystems was poorly integrated with management of conifer forests. Trends in hardwood ecosystem distribution show they are slowly declining on public lands. However, the rapid loss on private lands puts a greater responsibility on the Forest Service to maintain and enhance portions of hardwood ecosystems on national forest lands. The rapid loss of hardwood ecosystems on private lands puts a greater responsibility on the Forest Service to maintain and enhance portions of hardwood ecosystems on national forest lands.

The purpose of the proposed action is to provide a strategy and management standards and guidelines that will sustain desired conditions of hardwood forest ecosystem in the lower westside of the Sierra Nevada. This management direction will address hardwood ecosystem structure, composition and function necessary to maintain biological diversity.

The Proposed Action

The Forest Service proposes to establish management direction for national forest lands on the Modoc, Lassen, Plumas, Lake Tahoe Basin Management Unit, Tahoe, Eldorado, Stanislaus, Sequoia, Sierra, and Inyo National Forests in California, and the portion of the Humboldt-Toiyabe National Forest in Nevada that is in the Sierra Nevada to address the five problem areas. Each of the land and resource management plans for the affected forests and regional guides will be amended with this updated management direction.

Scientific thinking is varied and public expectations are not definitive for any of these problem areas, so a policy of adaptive management is integral to the proposed action. Adaptive management procedures will be used to adjust management direction for future events, changing knowledge, or

dynamic social views. Adaptive management involves: (1) establishing desired outcomes and steps towards achieving them based on scientific knowledge and assumptions about what is possible and what it would take to reach desired ends (this is essentially a management analog to hypothesis testing, which is used in research), (2) conducting inventories, monitoring, and research to generate new information (essentially “reading the management experiment,”) and (3) adjusting management objectives and strategies in response to the new information (the adaptation part). The proposed action thus identifies potential monitoring and research to provide the critical information needed to initiate management adjustments. Through adaptive management, knowledge gained from experience is used to adjust policy.

The proposed action also calls for identifying management options to: (1) link decisions at the project scale to forest plan decisions, (2) link forest plans to the efforts of other agencies, (3) prioritize treatments within watersheds or sub-watersheds, and (4) facilitate local collaborative stewardship.

Relationship to the Herger-Feinstein Quincy Library Group Recovery Act

The Herger-Feinstein Quincy Library Group Recovery Act (signed by the President of the United States on October 21, 1998) directs the Secretary of Agriculture to conduct a pilot project on the Lassen and Plumas National Forests and the Sierraville Ranger District of the Tahoe National Forest for a period of not more than 5 years. The Record of Decision implementing the pilot project was signed on August 20, 1999.

Proposals to change conservation for the California spotted owl would, when finalized, affect implementation of the pilot project authorized by the Act. Changes in management for other species for which viability is identified as a concern in this FEIS would also potentially affect implementation of the pilot project.

The relationship between species conservation measures proposed in this FEIS and implementation of the pilot project is considered in the analysis and described in the environmental consequences of this FEIS.

Decision to be made

The responsible officials will decide whether or not to amend the Land and Resource Management Plans for the Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sequoia, Sierra, and Inyo National Forests in California, Lake Tahoe Basin Management Unit, and the portion of the Humboldt-Toiyabe National Forest that is in the Sierra Nevada.

Decisions involved in the selection of an alternative will include adoption of the following, which are necessary to resolve the five problem areas:

- Management direction and goals;
- Desired future conditions expected over the next 50 to 100 years;
- Standards and guidelines to be used in designing and implementing future management actions;
- A strategy for inventory, monitoring, and research to measure progress toward attainment of desired conditions and to make adjustments in management where needed (adaptive management).

The Record of Decision for the Sierra Nevada Forest Plan Amendment EIS will amend management direction in national forest land management plans and regional guides to address the five problem areas. The relevant parts of the selected alternative will become part of the amended plans and will guide activity-level decision making until replaced through subsequent amendment or revision. Management direction and land allocations in existing plans will remain in effect unless superceded by or in conflict with decisions made from this planning effort.

The Regional Foresters for the Pacific Southwest Region and Intermountain Region will be the deciding officials. Both Regional Foresters will sign one Record of Decision.

Public Involvement

An extensive public involvement process for this FEIS began in September 1998, prior to issuing the Notice of Intent to amend the Land and Resource Management Plans for national forests in the Sierra Nevada and Modoc Plateau. Meetings and workshops were held throughout the Sierra Nevada and in San Francisco and Los Angeles so that individual citizens, private groups, tribes, elected officials, and public agencies could provide their perspectives to help frame the purpose and need and proposed action for the FEIS. A Statewide meeting was held in Davis, California in October. A Sierra Nevada tribal summit was held at Tahoe City, California in September 1998, and meetings with several American Indian tribes were held in Clovis, Bishop, Placerville, Susanville, Big Pine, and Oroville, California. Tribal members also attended several of the public meetings. This collaborative effort, completed prior to the development and analysis of alternatives, was important in identifying key problem areas facing the Sierra Nevada. Further, the USDI Fish and Wildlife Service (FWS), U.S. Environmental Protection Agency, and other State and Federal agencies were active participants in development of the FEIS.

FWS personnel are members of the interdisciplinary team.

On November 20, 1998, using information and ideas gathered during the preceding ten months, the Pacific Southwest Region and Intermountain Region published a Notice of Intent to prepare an Environmental Impact Statement in the Federal Register (Federal Register, November 1998), beginning a 60-day formal public scoping period. During the scoping period another series of public information meetings and workshops were held. Most were held in the same locations as the earlier meetings. Consultations with Native American tribes also continued during this period. To date, about 3,500 comments have been received and analyzed to help develop ways to improve national forest management. Significant issues were identified from these comments and used in the development of alternatives.

Issues

Comments received during the public involvement process revealed important issues or public concerns, which then became influential considerations in the design and evaluation of the alternatives. Issues were also identified by reviewing published scientific, administrative, and policy documents, including internal direction affecting management of the national forests, the California Spotted Owl RDEIS, the Sierra Nevada Ecosystem Project Report, the Final Report of the California Spotted Owl Federal Advisory Committee, and the Report of the California Forest EIS Review Committee.

Several issues were clearly dominant in many people's minds. These issues are addressed in detail in this FEIS and summarized below.

Ecosystem Management

There are different views about how to manage ecosystems to achieve the purpose and need for the Sierra Nevada Forest Plan Amendment Project. Some people advocate a preservation approach, essentially letting nature decide future ecosystem conditions and their associated societal benefits. Others believe that more active management is essential to achieve desired environmental conditions that best meet people's needs, and recommend that timber harvesting and prescribed fire be used to maintain healthy forest conditions. Still others advocate a balance of land conservation strategies where some lands are protected from human management and other lands are managed to achieve desired environmental conditions and associated social benefits.

Old Forest Ecosystems

A significant issue centers on the debate about the amount and distribution of old forest ecosystems needed to sustain viable populations of old forest associated species. In addition, both the public and scientific community have differing views about appropriate practices and methods for increasing and perpetuating old forests.

Riparian and Aquatic Ecosystem Health

There is disagreement over the appropriate level of management activities and types of uses in aquatic and riparian areas. One view is that management actions have the potential to degrade aquatic and riparian ecosystems. Others believe that aquatic and riparian ecosystem health can best be maintained and enhanced through active management.

Fire and Fuels

There are differing views regarding the type, rate, and intensity of actions that should be taken to reduce fuel hazards. Among those that believe management actions should be taken, there is disagreement over the method (for example, prescribed fire versus mechanical treatment) and strategy (for example, linear fuelbreaks versus strategic area treatments), treatment priorities, and where to emphasize treatments.

Habitat for Threatened, Endangered, and Sensitive Species

There is disagreement over how to best protect and restore habitat for wildlife, particularly threatened, endangered, and Forest Service sensitive species (for example, California spotted owl, northern goshawk, Pacific fisher, American marten, and Sierra Nevada red fox). Some advocate protection from both human interventions and nature's catastrophic events, for example, wildfire, while others advocate judicious management to encourage desired habitat conditions and reduce the risk of losses to catastrophic events.

Lower Westside Hardwoods

There is disagreement over how to best maintain and restore hardwood ecosystems. Some advocate active management to maintain and enhance hardwood forests through mechanical methods and prescribed fire. Others advocate a preservation approach with very little active management.

Social and Cultural

There are a wide variety of views over how the national forests should be managed to sustain desired environmental conditions and best meet people's economic and social needs. Some recommend, for example, that management should favor conditions that result largely from nature's forces and processes over social and economic uses. Others favor the opposite and conclude that high levels of natural resource production and use are compatible with a sustaining desired ecosystem conditions. Some recommend that, because local communities have such a clear cultural tradition and social and economic stake in the national forests, their voices and needs ought to be given significant consideration in designing and carrying out conservation policy. Still others are mindful that the national forests must serve the needs of all Americans, present and future, and that those needs should be provided equal weight with environmental concerns when designing conservation policy.

Roads and Access to National Forests

Debate concerning the extent and use of forest roads is a significant issue. Some believe that there are too many roads in the national forests - that roads are causing adverse impacts to wildlife, water quality, and other forest resources, and that the number of roads should be reduced. Others believe that, in most cases, roads should be open to the general public--that closing roads would make it more difficult to access remote areas for hunting, fishing, recreational driving, camping, woodcutting, and other activities.

Environmental Justice

With rapidly growing populations and changing demographics in the Sierra Nevada and throughout California, engaging everyone interested in the management of national forests is an increasingly complex task. For example, more than 59 distinct languages are spoken in California's schools; ethnic diversity among forest users and interest groups has added more complexity to the need to reconcile competing values for an increasingly pressured landscape. Many new and revived uses for resources in the national forests (such as medicinal plants) or new forms of recreation (such as mountain bikes and personal watercraft) and new attitudes about aesthetic enjoyment bring diverse interests into the debate over national forest management. Equity and access are two key issues for which the Forest Service is held accountable by law and public sentiment.

The Alternatives

The Sierra Nevada Forest Plan Amendment Project addresses five problem areas:

- old forest ecosystems and associated species;
- aquatic, riparian, and meadow ecosystems and associated species;
- fire and fuels management;
- noxious weeds; and
- lower westside hardwood ecosystems.

Each action alternative is designed around a management theme. The theme sets the vision for the alternative and responds to one or more of the significant issues. Each action alternative proposes management strategies, consistent with the theme of the alternative, to address the five problem areas.

The significant issues (described in the previous section) were addressed differently in the design of the alternatives. Several outside groups submitted specific proposals or concepts that were used with other information to develop the alternatives. The findings and management strategies from the SNEP Report, along with other scientific information, were used to develop the eight action alternatives. Finally, the no action alternative (no change in current management) was also analyzed in detail.

As a result of public comment, extensive scientific review, and consultation with other agencies, the Draft EIS alternatives were carefully reviewed between publication of the Draft EIS and the Final EIS. Refinements and suggestions the Forest Service judged important to bring forward to the Final EIS were collected into a modification of DEIS Alternative 8, and are displayed in the Final EIS as “Modified Alternative 8 (the preferred alternative).” In order to provide a comparison to Alternative 8, as it appeared in the Draft EIS, it is presented again in the Final EIS.

One alternative, exploring extensive use of fire, was considered infeasible because of associated air quality impacts and costs, and was eliminated from detailed study.

The Choice: Understanding Differences and Similarities between Alternatives

The Sierra Nevada is an enormously varied region—foothills to alpine, deserts to dense forest, densely populated to sparsely populated, highly developed recreation sites to pristine wilderness. It is changing rapidly in response to ecological succession, periods of severe drought, recurrent wildfire, cultural change, population growth, and economic prosperity. There are multiple possibilities for designing management strategies that sustain desired environmental conditions while meeting people’s needs. The fundamental social choice is how, where, and to what extent management activities—that is, stewardship decisions—will work to encourage the development of desired environmental conditions while anticipating and mitigating undesirable environmental, social, or economic outcomes.

Shared Features of the Action Alternatives

Each of the eight action alternatives has shared features. For example, all action alternatives:

- protect large trees, typically associated with old forest conditions, across the Sierra Nevada national forests;
- have an aquatic management strategy (AMS) that incorporates current scientific knowledge and ensures that Californians will continue to enjoy the water quality and quantity to which they are accustomed. The AMS common to all action alternatives includes the following six elements: (1) aquatic management strategy (AMS) goals, (2) watershed restoration, (3) riparian area designation and management (including stream buffer areas and aquatic refuges), (4) standards and guidelines that maintain natural watershed processes and mitigate management impacts, (5) a long-term strategy for anadromous fish-producing watersheds in the Lassen National Forest, and (6) an adaptive management program that includes an array of monitoring and research activities;
- treat fuels to reduce losses in the urban wildland intermix zone, where human health and safety concerns dominate;

- increase attention to threats posed by the unchecked spread of noxious weeds and put in place a means to arrest their spread;
- protect lower westside hardwoods and enhance conditions for hardwood species;
- use landscape analysis to provide a context for managing whole ecosystems and to better understand how landscapes and watersheds function before projects are planned; and
- use an adaptive management process to adjust management direction for future events, changing knowledge, or dynamic social views. Adaptive management involves: (1) establishing desired outcomes and steps towards achieving them, based on scientific knowledge and assumptions about what is possible and what it would take to reach desired ends, (2) conducting inventories, monitoring, and research to generate new information and (3) adjusting management objectives and strategies in response to the new information.

Differences between Alternatives

All action alternatives have integrated strategies to address the five problem areas while dealing with significant issues. For example, the alternatives vary in how old forest conditions are identified and managed, from small patches to larger watersheds to even larger landscapes across Sierra Nevada national forests, to provide wildlife habitat, increase biological diversity, and meet people's needs for recreation access and clean water. In addition, the alternatives differ in the methods used to designate riparian areas, and in the management activities allowed in these areas.

For many citizens, the most important difference between alternatives is in the extent to which fire and fuel treatments are carried out. Fuel treatments to reduce losses in the urban wildland intermix zone are common to all alternatives; the alternatives vary in the degree to which wildfire losses and intensity are affected in broader forested areas. There are different tradeoffs related to risks to the environment from wildfire and other natural disturbances, risks to the environment from fuel treatments, and direct and foregone costs and benefits to both the environment and its ability to meet human needs. Uncertainty about the consequences associated with implementing or not implementing fuel treatments further differentiates the alternatives. Each alternative therefore incorporates a strategy for adaptive management--learning from experience to reduce uncertainties caused by a lack of knowledge--but each is differently configured to work in concert with or anticipate the very large forces of natural succession, drought, and wildland fire that could easily dwarf the best efforts of humans to conserve their national forests and achieve both the environmental and social benefits of conservation.

Alternative 1

Theme: Continue management in existing national forest land and resource management plans.

Alternative 1 is the no action alternative required by the National Environmental Policy Act. Management in the planning area would continue under existing decisions and management direction in the Records of Decision for the land and resource management plans and applicable amendments for the 11 Sierra Nevada national forests.

Old Forest Ecosystems. Old forest ecosystems would be protected by: (1) retaining 5 percent of each forest type in mature seral stages; (2) designating specific areas, such as California spotted owl

protected activity centers and spotted owl habitat areas; and (3) retaining large trees, snags, and down logs as directed in the Interim Guidelines for the Management of the Sierran Province of the California Spotted Owl.

Aquatic, Riparian, and Meadow Ecosystems. Riparian and meadow ecosystems would be protected and managed, with a focus on restoring and maintaining healthy conditions. Specific direction for these areas would vary between national forests. Most willow flycatcher habitat management direction would be developed at the project-level.

Fire and Fuels. Fire management would be focused on protection of resources, lives, and property through rapid detection of fires, prevention of human-caused ignitions, and suppression of fires. Fuel hazard strategies would vary between national forests, and would include shaded fuel break construction, prescribed burning, disposal of debris, and wildland fire use in wilderness areas.

Noxious Weeds. Noxious weed programs would be conducted in accordance with 1995 Forest Service Manual for noxious weed management.

Lower Westside Hardwood Forest Ecosystems. Hardwood management would primarily focus on providing deer habitat, producing fuel wood, and managing rangelands for livestock grazing.

Alternative 2

Theme: Establish large reserves where management activities are very limited.

Alternative 2 establishes large reserves, where human management is very limited, to maintain and perpetuate old forest, aquatic, riparian, meadow, and hardwood ecosystems. Alternative 2 responds to views that ecosystems should be protected from all but minimal human-caused disturbances and conditions that “nature” delivers are desired.

Old Forest Ecosystems. Old forest ecosystems would be protected through a network of biodiversity reserves that emphasize protection on approximately 4.9 million acres, in addition to the more than 2.5 million acres of Wilderness and Wild and Scenic River Areas that already exist in Sierra Nevada national forests. Within these reserves, prescribed fire would be used to reduce fuels while timber harvest and fuelwood gathering would be prohibited, except for limited salvage. Additional areas outside these reserves, such as the southern Sierra fisher conservation area, spotted owl home ranges, goshawk post-fledgling areas, and goshawk foraging areas, would also be protected.

Aquatic, Riparian, and Meadow Ecosystems. The aquatic management strategy (AMS) in Alternative 2 includes the six common AMS elements as well as emphasis watersheds, critical aquatic refuges, and important bird areas.

Riparian areas would be delineated for all streams as well as for springs, seeps, vernal pools, ponds, lakes, wetlands and bogs using the variable-width approach described in the SNEP Report. An inner (green) zone would be delineated on both sides of the stream or aquatic area, extending out 150 feet (slope distance). An outer (grey) zone would make up the remainder of the riparian area. The total width of the riparian area (green and grey zones combined) would vary from 412 to 670 feet on each side of the stream or aquatic area, depending on soil and slope conditions. Inner zones of riparian areas would receive high levels of protection from ground-disturbing management activities. Timber

harvest and mechanical fuel treatments would be prohibited in riparian areas along perennial and intermittent streams and in critical aquatic refuges, but permitted along ephemeral streams.

Emphasis watersheds and critical aquatic refuges would have high priority for watershed restoration focused on important species populations and habitats. Each national forest would establish and manage a network of approximately 10 to 15 meadows as important bird areas, based on importance to a variety of bird species, including willow flycatcher.

Fire and Fuels. Fire management would focus on full control of all fires regardless of cause. Minimum-impact fire suppression tactics would be used in reserves, where possible. Fuel reduction would be focused on increasing wildland firefighter safety and efficiency. A estimated 20,000 to 30,000 acres per year of fuel reduction treatments, including thinning or prescribed fire, would be conducted in areas adjacent to human communities, reserves, and other highly valued resources.

Noxious Weeds. Reserves would have high priority for noxious weed prevention and eradication. Native species would be reintroduced, where appropriate.

Lower Westside Hardwood Forest Ecosystems. Reserves would contain approximately 85 percent of the mapped hardwood stands on national forests. Active management would be largely confined to the urban wildland intermix zone, which accounts for approximately 5 percent of the national forest hardwood acres. Most hardwood trees would be retained, and grazing on hardwood seedlings and saplings would be restricted to no more than 20 percent of annual of growth.

Alternative 3

Theme: Actively manage to restore ecosystems. Use local analysis and collaboration.

Alternative 3 emphasizes restoration of desired ecosystem conditions and ecological processes through active management determined through landscape analysis, monitoring, and local collaboration. Management activities would promote ecosystem conditions and ecological processes expected within natural ranges of variability under prevailing climates.

Landscape analysis would be required for all watersheds at scales of approximately 13,000 to 130,000 acres, and could be conducted at smaller scales as needed. Management activities proposed for implementation prior to completion of the landscape analysis would require supporting rationale, information, and data. Such documentation would demonstrate that the proposed project or activity was consistent with range-wide and area-specific goals and objectives.

Old Forest Ecosystems. Old forest ecosystems would be protected through: (1) a network of old forest emphasis areas, comprising approximately 30 percent or more than 3.1 million acres of national forest in the Sierra Nevada; (2) designation of California spotted owl activity centers and forest carnivore den sites; and (3) a network of unroaded areas and ecologically significant areas.

Key strategies in old forest emphasis areas include promoting fire regimes of frequent, low to moderate intensity fires and retention of old forest structural elements, including large, old trees greater than 30 inches diameter at breast height (dbh), snags, and down logs. Prescribed fire would be emphasized in high quality late successional areas (LSOG ranks 4 and 5) in old forest emphasis areas. However, other management tools, including mechanical fuels treatments, could be used as needed to enhance late successional structures and conditions

The general forest, totaling approximately 3.3 million acres, would be managed to promote frequent, low- to moderate-intensity fire regimes and restore old forest structural components, such as large, old trees, snags, and logs. All live trees greater than or equal to 30 inches dbh would be retained in the general forest.

Aquatic, Riparian, and Meadow Ecosystems. The aquatic management strategy (AMS) in Alternative 3 includes the six common AMS elements. Project-level interdisciplinary teams would be responsible for delineating variable-width riparian areas, based on the approach described in the SNEP Report. (See the description of Alternative 2.) The inner zones of these areas would provide high levels of protection from ground-disturbing management activities.

Landscape analysis would be required prior to conducting management activities in riparian zones unless the activities promoted functioning ecosystems for riparian-dependent and aquatic species and were consistent with riparian management objectives.

Fire and Fuels. The fire and fuels strategy in Alternative 3 emphasizes reducing the potential for large, high intensity wildland fires and promoting fire regimes of frequent, low- and moderate-intensity fires. This would be accomplished by increasing the use of prescribed fire, shifting the focus of timber management toward fuels management, reducing fuels in areas characterized by high fire hazard and risk, using least cost fire suppression strategies consistent with resource management objectives, and educating the public about the ecological role of fire.

Alternative 3 has a landscape-scale fuel hazard reduction program designed to reduce the potential for uncharacteristically severe wildfire effects. To accomplish this, Alternative 3 provides direction for establishing and maintaining a mosaic of strategically placed area treatments (SPLATs), each ranging from 50 to 1,000 acres or more, across landscapes. Treatments would be arranged to interrupt fire spread and reduce the potential for severe fire effects. Treatments would shift across landscapes over time as vegetation conditions changed; hence, different areas would be treated over time.

Achieving the goal of reducing the potential for severe wildfire effects at a landscape scale requires that managers treat enough area in the appropriate locations. When 30 to 40 percent of a landscape area has been strategically treated to reduce fuels, fire behavior is not only modified in the treated areas, but across the entire landscape as well. With this goal in mind, treatments could be conducted in all land allocations, except in Wilderness and Wild and Scenic River Areas or where existing forest plan standards and guidelines place restrictions on management activities. (These areas would be targeted for wildland fire use, where lightning-caused fires could be used to reduce fuels or provide other ecological benefits.) Standards and guidelines for protected activity centers and forest carnivore den sites direct managers to avoid placing SPLATs in these areas where possible and to design fuel treatments in a manner that minimizes impacts to the PAC's or den site's existing functional integrity and habitat suitability. Management objectives and standards and guidelines for unroaded areas, old forest emphasis areas, ecologically significant areas, and riparian areas are consistent with implementing a program of strategically placed area treatments.

Alternative 3 would establish priorities for fuels reduction at a region-wide scale based on areas currently mapped as having high fire hazard and risk. This strategy emphasizes fuels reduction treatments at lower and mid-elevations.

Noxious Weeds. The noxious weed strategy would emphasize reducing affected areas and preventing weed spread, particularly in ecologically significant areas and old forest emphasis areas.

Lower Westside Hardwood Ecosystems. Hardwood ecosystems would be managed to move conditions toward potential natural hardwood communities, essentially pre-European conditions. The lower westside hardwood ecosystem strategy would involve comparing existing vegetation conditions with desired conditions during landscape analysis to determine needs for restoring and enhancing hardwood ecosystems. Potential natural vegetation communities (the vegetation communities that would occur if stand succession were allowed to proceed under a natural fire regime in the prevailing climate) would provide the basis for desired conditions.

Alternative 4

Theme: Develop ecosystems that are resilient to large-scale, severe disturbances.

Alternative 4 emphasizes the development of forest ecosystem conditions that anticipate and are resilient to large-scale, severe disturbances, such as drought and high intensity wildfire, common to the Sierra Nevada. The alternative is consistent with the view that ecosystems should be actively managed to meet ecological goals and socioeconomic expectations. Alternative 4 would have the greatest number of acres available for active management including timber harvest.

Landscape analysis would be required for all watersheds at scales of 13,000 to 130,000 acres; however, projects could continue in the interim until analyses were completed.

Old Forest Ecosystems. Old forests would be actively managed to: (1) restore old forest conditions shaped by frequent fire, (2) increase resiliency to severe disturbance events, and (3) maintain approximately 15 to 20 percent of national forests at the Sierra-wide scale in old forest conditions. Designating protected activity centers for California spotted owl, northern goshawk, and forest carnivores would also perpetuate old forest conditions. Timber harvest would be permitted within old forest emphasis areas to protect and enhance late-successional forests. Twenty percent of each watershed would be maintained in old forest patches (defined as at least six large (greater than 30 inches dbh) trees per acre). Large trees could be harvested only when a Sierra-wide goal of 15 to 20 percent of national forest lands in old forest patches was achieved and maintained.

The general forest, totaling approximately 6.4 million acres, would be managed for a mix of seral stages across the landscape, using commercial timber harvest where appropriate to partially offset the cost of treatment and to achieve desired conditions.

Aquatic, Riparian, and Meadow Ecosystems. The aquatic management strategy (AMS) in Alternative 4 includes the six AMS elements common to all action alternatives. Riparian areas would be delineated using the variable-width approach described in the SNEP Report. (See the description of Alternative 2.) Commercial timber harvest and salvage would be allowed in riparian areas to enhance aquatic and riparian conditions.

Fire and Fuels. The fire and fuels strategy in Alternative 4 is designed to minimize the threat of wildfire, using strategically located fuels treatments (including defensible fuel profile zones and strategically placed treatment areas). Strategically placed defensible fuel profile zones (DFPZs) would be treated to break up the continuity of hazardous fuels. In addition, a mosaic of strategically placed area treatments (SPLATS, each ranging from 50 to 1,000 or more acres) would be established and maintained to interrupt fire spread and reduce the potential for severe fire effects. Fuels

treatments would use both prescribed fire and mechanical methods, such as timber harvest.

Treatments would shift across landscapes over time as vegetation conditions changed; hence, different areas would be treated over time. Treatments could be conducted in all land allocations, except in Wilderness and Wild and Scenic River Areas or where existing forest plan standards and guidelines place restrictions on activities. (These areas would be targeted for wildland fire use, where lightning-caused fires could be used to reduce fuels or provide other ecological benefits.) Standards and guidelines for protected activity centers and forest carnivore den sites direct managers to design treatments in a manner that minimizes impacts to the existing functional integrity and habitat suitability of these areas. Management objectives and standards and guidelines for old forest emphasis areas and riparian areas are consistent with implementing the strategically located fuels treatment program.

Noxious Weeds. The noxious weed strategy would emphasize application of registered herbicides to control and eradicate weed populations. Active management would be emphasized to enhance and restore resilient hardwood ecosystems.

Lower Westside Hardwood Forest Ecosystems. Alternative 4 prescribes separate desired conditions and management strategies for montane hardwood and blue oak woodland ecosystems. For montane hardwood ecosystems, watershed-scale desired condition is a mixture of early or mid seral conditions (30 percent) and late seral conditions (70 percent). A variety of silvicultural tools could be used to move montane hardwood ecosystems toward desired conditions. Blue oak woodlands would be characterized by large-tree dominated stands with small tree recruitment and regeneration sufficient to replace large tree mortality. Livestock grazing standards would be reviewed and adjusted as needed to meet stand restoration goals. Management in blue oak woodland stands could include noxious weed eradication, fuelwood collection, prescribed burning, and tree planting.

Alternative 5

Theme: Preserve existing undisturbed areas and restore others to achieve ecological goals. Limit impacts from active management through range-wide management standards and guidelines.

Alternative 5 preserves existing undisturbed areas and restores others to achieve ecological goals. Alternative 5 emphasizes reintroducing fire as a natural process and using fire to reduce fire and fuel accumulations.

Unroaded areas larger than 5,000 acres, ecologically significant unroaded areas between 1,000 and 5,000 acres, and inner zones of riparian areas would be preserved and left to develop under natural processes. Other areas, including old forest emphasis areas and general forest, would be restored under a limited active management approach to increase the amount of, and enhance processes associated with, old forest conditions. Alternative 5 limits impacts from management activities by specifying range-wide management standards and guidelines.

Landscape analysis would be required prior to implementing project level actions that require NEPA documentation in an environmental assessment or environmental impact statement.

Old Forest Ecosystems. Old forest ecosystems would be protected through: (1) a network of old forest emphasis areas, covering approximately 40 percent, or 4.6 million acres, of national forest in

the Sierra Nevada; (2) protected activity centers for the California spotted owl, northern goshawk, great gray owl, and forest carnivores; (3) a network of unroaded areas to protect spotted owls, northern goshawks, and forest carnivores and their habitat from impacts of roads; (4) protection for old forest patches larger than 5 acres; and (5) protection of large trees and other key wildlife habitat elements. Timber harvest within old forest areas would be limited to removal of understory trees to enhance late successional conditions.

Within the general forest, approximately 2 million acres, limited timber harvest could be conducted under standards and guidelines similar to the California Spotted Owl Interim Guidelines.

Aquatic, Riparian, and Meadow Ecosystems. The AMS strategy in Alternative 5 includes the six AMS elements common to all action alternatives.

Alternative 5 also recognizes aquatic diversity areas, critical aquatic refuges, and important bird areas. Aquatic diversity areas and critical aquatic refuges would overlay other land designations, and have high priority for watershed restoration. Each national forest would establish and manage a network of approximately 10 to 15 meadows, referred to as important bird areas, based on their importance to a variety of bird species, including willow flycatcher.

Riparian areas would be delineated using the variable-width approach described in the SNEP Report. (See the description of Alternative 2.) Timber harvest would be prohibited in inner riparian area zones. No land-disturbing activities (including timber harvest, permanent or temporary road construction, prescribed fire, or heavy equipment use) would be allowed in outer zones of riparian areas unless these activities were beneficial to water quality or fish and other riparian-dependent species in the short- and long-term.

Fire and Fuels. Each national forest would evaluate fire risk and hazard using a standardized protocol that would be applied region-wide. Priorities for treatment would be based on the risk to life, property, and natural resources, using criteria such as the quantity and type of fuels, fire ignition history, elevation, slope, and aspect. These evaluations would be used to distribute funds from the regions to each national forest, with funding allocated to treat the highest priority areas first.

Fuel reduction treatments would be conducted in the urban wildland intermix zone using mechanical treatments, including timber harvest, and prescribed fire. In areas outside the urban wildland intermix zone, outside major transportation route corridors, and away from facilities and structures, prescribed fire would be emphasized to reduce excessive fuel accumulations.

Noxious Weed Strategy. Alternative 5 emphasizes preventing and reversing weed spread to protect and enhance ecological values. Management actions for containing, controlling, and eradicating weeds as well as preventing the new weed introductions would be identified during landscape analysis.

Alternative 5 emphasizes a cautious approach to herbicide use. Herbicides could only be used after an interdisciplinary team determined that: (1) other weed control methods were unlikely to be successful and (2) all appropriate measures to minimize risk of adverse impacts to non-target organisms had been identified and incorporated into the project.

Lower Westside Hardwood Forest Ecosystems. Alternative 5 emphasizes management through a network of unroaded and wildlife oriented land allocations where natural processes prevail. The network of designated areas would provide connectivity between valley and montane ecosystems for movement of natural processes and wildlife. Hardwood ecosystems would be sustained through natural processes and prescribed fire with limited amounts of mechanical fuels treatments. These ecosystems would be enhanced through hardwood recruitment, grazing modification, and fuels treatments.

Alternative 6

Theme: Integrate desired conditions for old forest and hardwood ecosystems with fire and fuels management goals. Reintroduce fire into Sierra Nevada forest ecosystems.

Alternative 6 integrates desired conditions for old forest and hardwood conservation with fire and fuels management. This alternative provides direction for implementing a landscape-scale strategic fuels treatment program in high-risk vegetation types across Sierra Nevada landscapes to: (a) reduce the potential for large severe wildfires, and (b) increase and perpetuate old forest and hardwood ecosystems, providing for the viability of species associated with these ecosystems.

Alternative 6 emphasizes re-introducing fire into Sierra Nevada ecosystems, particularly old forest ecosystems. It uses active management to protect and restore desired ecosystem conditions. Prescribed fire is emphasized in old forest emphasis areas, while a mix of prescribed fire and mechanical treatments may be used in general forest areas to move toward and maintain desired conditions.

Watersheds with old forest emphasis areas characterized by high fire hazard and risk would have highest priority for landscape analysis. .

Old Forest Ecosystems. Old forest ecosystems would be protected through: (1) a network of old forest emphasis areas, comprising approximately 30 percent of national forest in the Sierra Nevada, or 3.1 million acres; (2) designation of protected activity centers for California spotted owls and northern goshawks and forest carnivore den sites; (3) retention of old forest structural elements in areas outside old forest emphasis areas; (4) protection of large trees across the landscape; and (5) reintroduction of fire as an ecological process and reduction of fire hazard within old forest emphasis areas. Active management of old forest emphasis areas would be primarily through prescribed fire, using mechanical treatments adjacent to roads, areas of high fire hazard and risk, and areas where reintroduction of fire would not be feasible without mechanical treatment.

Alternative 6 establishes desired conditions for vegetation structure at both the landscape scale and patch (or stand) scale. Desired conditions are based on conditions expected under natural fire regimes. In all forest types, desired condition is to have at least 50 percent of the landscape in old forest patches; desired stand densities and large tree sizes vary by forest type and site condition. Old forest emphasis areas would have greater proportions of their area in old forest patches, with the amount of area in old forest patches determined by site capability. At least 30 percent of the old forest patches would provide dense, multi-layered canopy conditions (greater than 70 percent canopy cover and at least three canopy layers).

Aquatic, Riparian, and Meadow Ecosystems. The aquatic management strategy in Alternative 6 includes the six elements common to all action alternatives. Alternative 6 provides direction for emphasis watersheds, critical aquatic refuges, and important bird areas.

Riparian conservation areas (RCAs) would be delineated for all perennial and seasonally flowing streams and around meadows, lakes, ponds, fens, and bogs. Perennial streams and meadows, lakes, ponds, fens, and bogs larger than 1 acre would have 300-foot (slope distance) wide RCAs on each side; seasonally flowing streams and smaller wet areas would have 100-foot wide RCAs on each side. New ground disturbing activities could only be conducted in an RCA if a landscape analysis or project analysis demonstrated that proposed activities were consistent with aquatic management strategy goals and riparian conservation objectives.

Within the RCA, an inner riparian community protection zone (RCPZ) would be delineated for at least 150 feet on each side of all perennial streams and for a distance based on riparian characteristics and slope steepness on each side of seasonally flowing streams. In general, ground-disturbing activities would be prohibited within the RCPZ unless the activity directly benefited the riparian or aquatic community.

Emphasis watersheds and critical aquatic refuges would have high priority for watershed restoration. Vegetation management activities (such as prescribed burning, mechanical fuels reduction, and timber harvest) would be conducted in critical aquatic refuges only when landscape analysis identified such activities as opportunities that contributed toward attaining the aquatic management strategy goals. Each national forest would establish and manage a network of approximately 10 to 15 meadows, referred to as important bird areas, based on their importance to a variety of bird species, including willow flycatcher.

Fire and Fuels. The goal of fire and fuels management is to alter fire regimes through a program of strategic fire hazard reduction treatments that reduce the potential for severe wildfire effects. In order to influence uncharacteristically severe wildfires, an estimated 30 to 40 percent of the landscape in the oak woodland, ponderosa pine, eastside pine, and mixed conifer-pine vegetation types would receive fuel hazard reduction treatments over a 25-year period. Achieving this goal would require approximately 130,000 acres of treatment per year, arranged in a mosaic of area treatments (termed strategically placed area treatments, or SPLATS), each approximately 50 to 1,000 acres or more. These area treatments would be arranged to interrupt fire spread. Treatments would initially be focused on south and west aspects and upper slopes, but could be conducted on north and east aspects, as needed, to minimize conflicts with sensitive species habitats. Treatments would shift across landscapes over time as vegetation conditions changed; hence, different areas would be treated over time.

Achieving the goal of altering fire regimes to reduce the potential for severe wildfire effects requires that managers treat enough area in the appropriate locations. When 30 to 40 percent of a landscape area has been strategically treated to reduce fuels, fire behavior is not only modified in the treated areas, but across the entire landscape as well. With this goal in mind, fuel treatments to support the SPLAT strategy could be conducted in all land allocations, except in Wilderness and Wild and Scenic River Areas or where existing forest plan standards and guidelines place restrictions on management activities. (These areas would be targeted for wildland fire use, where lightning-caused fires could be used to reduce fuels or provide other ecological benefits.) Standards and guidelines for protected activity centers and forest carnivore den sites direct managers to avoid placing SPLATs in these areas

where possible and to design fuel treatments in a manner that minimizes impacts to the PAC's or den site's existing functional integrity and habitat suitability. Management objectives and standards and guidelines for old forest emphasis areas, critical aquatic refuges, and riparian areas are consistent with a program of implementing strategically placed area treatments.

Alternative 6 emphasizes prescribed fire to meet fire hazard reduction goals. Mechanical treatments would be used in areas where prescribed fire could not be safely applied.

Noxious Weeds. The noxious weed strategy would emphasize an active management approach to eradicating existing infestations combined with a program of noxious weed prevention. Managers would give high priority to weed control and eradication projects in old forest emphasis areas, emphasis watersheds, critical aquatic refuges, and important bird areas. Planning for activities in the general forest would consider adjacent emphasis areas, as prescribed fire and mechanical fuel treatments in these areas could hasten weed spread or worsen existing infestations.

Lower Westside Hardwood Forest Ecosystems. Lower westside hardwood forest ecosystem management in Alternative 6 would establish a desired condition for hardwood distribution based on the landscape's potential natural vegetation. Potential natural vegetation is the vegetation that would exist if natural processes were allowed to progress, including a natural fire regime, in today's climate. The national forests would use landscape analysis to compare the potential natural vegetation with existing conditions. Differences between these two would be used as a locator for management activities in hardwood ecosystems and to define stand restoration goals. Forest density would be dictated by local conditions, including soils, geology, position on the landscape, and slope steepness. Large hardwood trees (montane hardwoods greater than 15 inches dbh, blue oak woodland hardwoods greater than 12 inches dbh) would be retained except where removed by fire, or for public health and safety. Fuelwood collection of hardwoods would be limited to smaller trees and managers would be required to premark or precut hardwood trees for harvest to ensure that stand goals were met. Livestock grazing would also be managed to meet stand restoration goals. In old forest emphasis areas, desired condition would be to have at least 50 percent of the landscape in old forest patches.

Alternative 6 recognizes the importance of hardwoods in soil productivity and nutrient cycling by providing standards and guidelines to enhance existing hardwood trees after stand replacing events like fire or group selection. It also improves national forest and regional hardwood distribution data through landscape analysis and inclusion of hardwood trees in stand surveys.

Alternative 7

Theme: Actively manage entire landscapes to establish and maintain a mosaic of forest conditions approximating patterns expected under natural conditions.

Alternative 7 aims to establish and maintain a diversity of forest ages and structures over the landscape in a mosaic approximating patterns that would be expected under natural conditions, that is conditions characterized by current and expected future climates, biota, and natural processes. Ecosystems and ecological processes would be actively managed to maintain and restore them to desired conditions. Silvicultural treatments could produce timber and other forest products.

Alternative 7 relies on few land allocations, applying what is commonly termed a "whole forest approach." Most lands are designated in the "general forest" land allocation where active management is used to move landscapes toward desired conditions. Management is linked to desired

conditions for California Wildlife Habitat Relationships (CWHR) stages and old forest condition goals, specific to the major Sierra Nevada forest types.

Each national forest would conduct landscape analyses as needed to address principal management needs.

Old Forest Ecosystems. Old forest ecosystems would be protected through: (1) designation of protected activity centers for California spotted owls, northern goshawks, and forest carnivores, (2) protection of large old trees, and (3) development and maintenance of old forest patches specified through desired conditions for proportions of area in CWHR habitat stages by forest type. Management would be linked to desired CWHR habitat stage conditions and old forest goals established for each major Sierra Nevada forest type.

The desired CWHR habitat stage conditions would provide varying old forest conditions at landscape scales. These conditions would generally be expected to maintain suitable habitat for the California spotted owl, Pacific fisher, and American marten at landscape scales. Landscape analysis would be the mechanism for comparing existing and desired habitat conditions and old forest goals and identifying management opportunities for moving landscapes toward desired conditions.

Aquatic, Riparian, and Meadow Ecosystems. The aquatic management strategy in Alternative 7 includes the six AMS elements common to the action alternatives.

Riparian conservation areas (RCAs) would be delineated for all perennial and seasonally flowing streams and around meadows, lakes, ponds, fens, and bogs. Perennial streams and meadows, lakes, ponds, fens, and bogs larger than 1 acre would have 300-foot (slope distance) wide RCAs on each side; seasonally flowing streams and smaller wet areas would have 100-foot wide RCAs on each side. New ground disturbing activities could only be conducted in an RCA if a landscape analysis or project analysis demonstrated that proposed activities were consistent with aquatic management strategy goals and riparian conservation objectives.

Within the RCA, an inner riparian community protection zone (RCPZ) would be delineated for at least 150 feet on each side of all perennial streams and for a distance based on riparian characteristics and slope steepness on each side of seasonally flowing streams. In general, ground-disturbing activities would be prohibited within the RCPZ unless the activity directly benefited the riparian or aquatic community.

Fire and Fuels. The goal of fire and fuels management is to alter fire regimes through a program of strategic fire hazard reduction that reduces the potential for severe wildfire effects. Achieving this goal would require treating approximately 130,000 acres each year. Strategically placed fuel treatment areas (SPLATs), each about 50 to 1,000 acres or more, would be arranged in a mosaic across the landscape, initially located on the upper slopes of south and west aspects. However, treatments would be conducted on north and east aspects, as needed, to minimize conflicts with sensitive species habitats. These area treatments would be arranged to interrupt fire spread. Treatments would shift across landscapes over time as vegetation conditions changed; hence, different areas would be treated over time.

Fuel reduction treatments would be emphasized in the general forest, particularly in areas of high fire hazard and risk. Mechanical treatments would be emphasized for treating fuels although prescribed

fire would be used as well. Timber harvest and vegetation treatments to support this alternative's strategic fuels treatment approach would have highest priority for planning and implementation.

Achieving the goal of altering fire regimes to reduce the potential for severe wildfire effects requires that managers treat enough area in the appropriate locations. When 30 to 40 percent of a landscape area has been strategically treated to reduce fuels, fire behavior is not only modified in the treated areas, but across the entire landscape as well. With this goal in mind, fuel treatments to support the SPLAT strategy could be conducted in all land allocations, except in Wilderness and Wild and Scenic River Areas or where existing forest plan standards and guidelines place restrictions on management activities. (These areas would be targeted for wildland fire use, where lightning-caused fires could be used to reduce fuels or provide other ecological benefits.) Standards and guidelines for protected activity centers and forest carnivore den sites direct managers to avoid placing SPLATs in these areas where possible and to design fuel treatments in a manner that minimizes impacts to the PAC's or den site's existing functional integrity and habitat suitability. Management objectives and standards and guidelines for the general forest and riparian areas are consistent with implementing strategically placed area treatments.

Noxious Weeds. Each national forest would use the severity of the noxious weed problem as one factor in selecting watersheds for landscape analysis. Watersheds would be selected partially by the urgency of the need to address existing or imminent weed problems. The impacts of existing weed infestations on ecological function in the planning watershed would be a key consideration during landscape analysis.

Lower Westside Hardwood Forest Ecosystems. Alternative 7 uses the lower westside hardwood forest ecosystem strategy presented under Alternative 4, with separate desired conditions and management strategies for montane hardwood and blue oak woodland ecosystems.

For **montane hardwood ecosystems**, landscape-scale desired condition is a mixture of early and mid seral conditions (30 percent) and late seral conditions (70 percent). A variety of silvicultural tools could be used to move montane hardwood ecosystems toward the desired condition. Alternative 7 would also provide national forests with the flexibility to identify Hardwood Silviculture Areas, area that would be managed specifically for hardwood timber and fuelwood needs. These areas could make up a maximum of 20 percent of the montane hardwood ecosystem and allow for harvest of larger hardwood trees, up to 24 inches dbh.

Desired conditions for **blue oak woodland ecosystems** are large tree dominated stands with small tree recruitment and regeneration sufficient to replace large tree mortality. Livestock grazing standards would be reviewed and adjusted as needed to meet stand restoration goals. Management in blue oak woodland stands could include noxious weed eradication, thinning, prescribed burning, and tree planting.

Alternative 8

Theme: Manage sensitive wildlife habitat cautiously. Develop new information to reduce uncertainty about the effects of management on sensitive species.

Alternative 8 emphasizes a cautious approach to treating fuels in sensitive wildlife habitat. New information from research and administrative studies would be developed to reduce uncertainty about the effects of management on sensitive species. Until further guidelines were developed, treatments

in suitable California spotted owl habitat would retain specific levels of large trees, canopy cover, canopy layers, snags, and down woody material.

Landscape analysis would be required prior to proceeding with implementation of management actions requiring documentation in a Decision Notice or Record of Decision.

Old Forest Ecosystems. Old forest ecosystems would be protected through: (1) designation of old forest emphasis areas, comprising approximately 40 percent of national forest in the Sierra Nevada, or 4.7 million acres (2) designation of protected activity centers for spotted owls and northern goshawks and den sites for forest carnivores, and (3) retention of existing large trees. This alternative contains some key features designed to specifically address uncertainty with regard to habitat needs for California spotted owls and forest carnivores. These features include: (1) vegetation treatments that retain specific levels of canopy cover, canopy layering, large trees, basal area, snags and down woody material in suitable California spotted owl habitat, (2) designation and management of the southern Sierra fisher conservation area, and (3) provisions for conducting research and analyses to fill existing data gaps.

Aquatic, Riparian, and Meadow Ecosystems. The aquatic management strategy in Alternative 8 includes the six AMS elements common to the action alternatives. Alternative 8 also recognizes emphasis watersheds, critical aquatic refuges, and important bird areas.

Riparian areas would be delineated on each side of perennial, intermittent, and ephemeral streams and around lakes, ponds, springs, wetlands, vernal pools, and seeps. Perennial streams and lakes and ponds larger than 1 acre would generally have 300-foot (slope distance) riparian areas on each side; intermittent streams and smaller wet areas would have 150-foot (slope distance) riparian areas; and ephemeral streams would have 75-foot (slope distance) riparian areas. Timber harvest would be prohibited in riparian areas along perennial and intermittent streams. Timber harvest, with specific measures to protect downstream conditions, could be conducted along ephemeral streams.

Emphasis watersheds and critical aquatic refuges would have high priority for watershed restoration. Each national forest would establish and manage a network of approximately 10 to 15 meadows, referred to as important bird areas, based on their importance to a variety of bird species, including willow flycatcher.

Fire and Fuels. The goal of fire and fuels management is to treat fuels in a strategic manner wherever possible while protecting existing habitat for sensitive species, particularly old forest associated species. Strategically placed area treatments (SPLATs), each about 200 to 1,000 acres or more, would be arranged in a mosaic across landscapes, generally located on the upper slopes of south and west aspects (and where needed on east and north aspects to avoid conflicts with sensitive species habitats). Fuels would be reduced using mechanical treatments, prescribed fire, or both.

Vegetation management activities in Alternative 8 would emphasize establishing and maintaining SPLATs. However, fuel treatments would be required to meet the standards for retaining specific levels of canopy cover, canopy layers, basal area in large trees, snags, and down woody material in suitable California spotted owl nesting and foraging habitat. (For example, fuel treatments in suitable nesting habitat would retain a minimum of 70 percent canopy cover; fuel treatments in suitable foraging habitat would retain a minimum of 50 percent canopy cover.) In addition, fuel treatments in California spotted owl and northern goshawk PACs would be limited to understory burning and

mechanical treatments to remove small diameter fuels (less than 12 inches dbh). Fuel treatment in old forest emphasis areas would be limited to prescribed burning and removal of trees less than 12 inches dbh. Mechanical treatments would be prohibited in riparian areas along perennial and intermittent streams. Implementation of these standards and guidelines could preclude meeting fuel hazard reduction objectives within individual SPLATs. Achieving a goal of modifying landscape-scale fire behavior to reduce the potential for severe wildfire effects would be unlikely in many cases under this strategy.

Noxious Weeds. Alternative 8 uses the same approach for controlling noxious weeds described for Alternative 6. Alternative 8 also directs managers and researchers to assess whether noxious weeds are currently or imminently impacting the habitat of threatened, endangered, proposed, and sensitive species. Forest Service managers and researchers would routinely document the presence or absence of weeds as a component of habitat site visits and sampling for threatened, endangered, proposed, and sensitive species.

Lower Westside Hardwood Forest Ecosystems. Alternative 8 uses the same strategy for conserving lower westside hardwood forest ecosystems described for Alternative 6. Comparing existing conditions to potential natural conditions in landscape analysis would be used as a tool for identifying hardwood ecosystem goals and restoration projects. Potential natural vegetation is the vegetation that would exist if natural processes were allowed to progress, including a natural fire regime, in today's climate. This alternative would retain large trees and improve baseline information about hardwood ecosystems. Hardwood fuelwood collection would be limited to smaller trees and only conducted where removal of small hardwoods would contribute toward stand goals. Similarly, livestock grazing would be managed to meet needs for regenerating hardwood trees.

Modified Alternative 8 (The Preferred Alternative)

Theme: Manage sensitive wildlife habitat cautiously. Provide for species conservation while addressing needs to reduce the threat of fire to human communities.

Like Alternative 8, uncertainty about the possible effects of management activities on wildlife habitat is a dominant concern in Modified Alternative 8. Management direction is designed to address uncertainty and increase confidence that management actions will not adversely affect wildlife habitat. Modified Alternative 8 has the same basic components as Alternative 8; however, it provides more spatially explicit California spotted owl and fisher conservation strategies and better integration of these strategies with its aquatic management and fire and fuels management strategies.

Modified Alternative 8 provides for species conservation while addressing fire and fuels management. Vegetation treatments are limited to those designed for fire hazard reduction, maintenance activities, or public health and safety. Modified Alternative 8 recognizes the need to reduce the threat of fire to human communities: it provides for more intensive fuel treatments in urban wildland intermix zones. Outside of these zones, direction for treating forest fuels is more cautious, reducing the potential for treatments to degrade habitat.

Critical aquatic refuges would have highest priority for landscape analysis. Critical aquatic refuges are subwatersheds containing known, occupied, or historic riparian or aquatic habitat for threatened, endangered, and sensitive species. Landscape analysis would be completed for all national forest lands in the Sierra Nevada Forest Plan Amendment Project Area within a 5-year period.

Old Forest Ecosystems and Associated Species. Modified Alternative 8 uses a landscape-scale strategy of land allocations, combined with stand-level management standards and guidelines, to conserve old forest ecosystems and their associated wildlife species. The foundation of the strategy is based on providing and enhancing fundamental components of California spotted owl habitat, such as complex stand structures at nest sites, home ranges having moderate to high levels of tree canopy cover concentrated near nest sites, and habitat for primary prey species, particularly the northern flying squirrel. The landscape strategy accomplishes this goal at multiple spatial scales by: (1) protecting and managing old forest emphasis areas to provide high quality California spotted owl habitat, (2) protecting and managing spotted owl home range core areas to provide moderate to high levels of tree canopy cover, (3) managing general forest areas to maintain and increase amounts of suitable spotted owl habitat, (4) protecting all patches larger than 1 acre of high quality old forest characterized by large trees and high canopy closure (stands classified as CWHR 5M, 5D, and 6), and (5) addressing fire hazard and risk by strategically locating fuels treatments in the urban wildland intermix zone and in old forest emphasis areas characterized by high hazard and risk. The landscape strategy in Modified Alternative 8 also includes the southern Sierra fisher conservation area, which would be managed to support habitat needs of the Pacific fisher.

Aquatic, Riparian, and Meadow Ecosystems. The aquatic management strategy for Modified Alternative 8 includes the six elements of the aquatic management strategy common to all of the action alternatives. This alternative uses the stream-type approach for delineating riparian conservation areas. It also includes critical aquatic refuges where managers would consider the presence of important aquatic and riparian animal species and their habitats in planning activities. Modified Alternative 8 establishes riparian conservation objectives (RCOs), with a suite of standard and guidelines, for project level analysis in riparian conservation areas and critical aquatic refuges (CARs).

Riparian conservation areas (RCAs) are areas designated along streams and around water bodies. Management in RCAs is directed at: (1) preserving, enhancing, and restoring habitat for riparian- and aquatic-dependent species; (2) ensuring that water quality is maintained or restored; (3) enhancing habitat conservation for species associated with the transition zone between upslope and riparian areas; and (4) providing greater connectivity within watersheds. RCA widths range from 300 feet on either side of perennial streams and water bodies to 150 on either side of seasonally flowing streams. RCAs could be adjusted to meet riparian conservation objectives during site-specific project analysis.

Management activities in RCAs and CARs would be determined through local site-specific analyses. RCOs and their associated standards and guidelines would be analyzed for projects located within RCAs or CARs. The analysis would consider physical factors (such as soil characteristics, geology, slope, and stream characteristics) and biological factors (such as aquatic- riparian-dependent species present, their habitat needs, and the capability of the existing environment to provide needed habitat). RCA widths described in the preceding paragraph could be adjusted at the project level if a landscape analysis had been completed and the site-specific RCO analysis demonstrated a need and rationale for different widths.

Fire and Fuels. Modified Alternative 8 uses a strategic approach for locating fuels treatments across broad landscapes. Urban wildland intermix zones would have highest priority for fuels treatments; fuels in the inner defense zone of the urban wildland intermix zone would be more intensively treated to prevent the loss of life and property. Outside the defense zone, but within the threat zone of the

urban intermix, forest fuels would be treated in a less intensive manner in PACs and in stands comprised of large trees with moderate- to dense canopy cover (as described in the standards and guidelines specific to these areas). Outside the urban wildland intermix zone, old forest emphasis areas characterized by high fire hazard and risk would have the next highest priority for fuels treatments, followed by general forest areas with high fire hazard and risk. Fuel treatments within sensitive habitats would be approached in a more cautious manner by limiting the intensity of treatments in old forest emphasis areas and California spotted owl home range core areas (in addition to PACs and stands characterized by large trees and moderate- to dense canopy cover). This priority for fuels treatments is consistent with the theme of this alternative, which addresses concerns about uncertainties surrounding the impacts of fuels (and vegetation) management on wildlife habitat.

In areas outside the defense zone of the urban wildland intermix zone, fuel treatment areas (ranging from 50 to 1,000 acres) would be strategically located to interrupt wildland fire spread and reduce fire intensity. Treatments would be conducted in areas of high fire hazard and risk (identified in an annually updated Sierra Nevada fire risk and hazard map) and would initially be focused on south and west aspects and upper slopes (except where adjusted to minimize conflicts with habitat for sensitive species). The overall goal of this landscape-level fuels strategy is to treat 30- to 40-percent of the landscape area in mid- and lower-elevation forest types.

Noxious Weeds. Forest Service managers would work cooperatively with State and local agencies to prevent the introduction and establishment of noxious weed infestations and to control existing infestations. Modified Alternative 8 directs managers to conduct a noxious weed risk assessment as part of project planning to determine whether project activities have low, moderate, or high risk for weed spread. Managers would apply mitigation measures, as needed, based on the weed prevention practices presented in the Pacific Southwest Region's noxious weed management strategy. Other key elements of Modified Alternative 8's noxious weed strategy include: (1) requiring off-road equipment and vehicles used to implement Forest Service projects to be weed free; (2) encouraging the use of weed free hay and straw; (3) prescribing weed prevention measures, as needed, when permits for livestock grazing, special uses, pack stock operators, and other uses are amended or reissued; (4) including weed prevention and treatment measures in mining plans of operation and mine reclamation plans; (5) completing noxious weed inventories; and (6) emphasizing the eradication of new, small weed infestations.

Lower Westside Hardwood Forest Ecosystems. The lower westside hardwood forest ecosystem strategy for Modified Alternative 8 involves comparing existing vegetation conditions with desired conditions during landscape analysis to determine needs for restoring and enhancing hardwood ecosystems. Potential natural vegetation communities, which would occur if stand succession were allowed to proceed under a natural fire regime in the prevailing climate, would provide the basis for desired conditions in hardwood ecosystems.

This alternative would retain large hardwood trees and improve baseline information about hardwood ecosystems. To the extent possible, all large hardwoods, which for montane hardwood species are trees 12 inches or greater dbh and for blue oak woodland species are trees 8 inches or greater dbh, would be retained during mechanical fuel treatments, salvage operations, and prescribed fire treatments (recognizing that some losses to prescribed fire could occur). Larger hardwood trees could be removed if research supported the need to remove larger trees to meet hardwood stand maintenance and restoration goals. Livestock grazing would be managed to meet needs for regenerating hardwood trees.

Environmental Consequences

This section of the summary compares the alternatives by summarizing their environmental consequences. It is organized in three sections: the five problem areas, focal species, and socio-economic concerns.

Chapter 3 describes the environmental consequences of the alternatives in detail. This section of Chapter 2 compares the alternatives by summarizing their environmental consequences. It is organized in three sections: the five problem areas, focal species, and socio-economic concerns.

Problem Areas

Old Forest Ecosystems

All of the alternatives would maintain and enhance old forest conditions across Sierra Nevada landscapes. However, they would have different effects on: (1) amounts and distribution of old forest conditions, (2) potential losses of old forests to wildfire, and (3) old forest ecosystem functions and processes.

Amount and Distribution of Old Forest Conditions. The number of large, old trees would increase under all alternatives. However, Alternatives 4 and 6 would have the greatest likelihood of maintaining large, live trees with a net increase in large trees in both the short and long term. Alternatives 2, 5, 8, Modified 8 could provide the greatest amounts of old forest patches with high canopy closure (cover) in the short-term; however, because of restrictive or less effective fuel treatments these increases could be offset by increased future losses to wildfire. Alternative 6 would have increases in old forest patches with high and moderate canopy closure (cover) and the greatest certainty that more old forest patches could be protected from wildfire losses.

Potential Losses to Severe Wildland Fires. Predicted acres burned during wildfires decreases by an estimated 17 percent in Alternatives 3, 4, 6, and 7; slight increase in Alternatives 8 and Modified 8; greater increases in Alternatives 1, 2, and 5. What is more important to effects on old forests is the probability of future fires in concentrations of existing old forest and the level of mortality associated with the predicted fires. Alternatives 4 and 6 emphasize fuel treatments in a strategic pattern, and watersheds with the highest fire hazard and risk have highest priority for treatment. Therefore, expected losses of old forest from severe wildfire are least for these alternatives. Alternatives 8 and Modified 8 also use a strategic fuels reduction approach, and watersheds with the highest fire hazard and risk rating have highest priority for treatment. However, fuel treatment levels and rates in Alternatives 8 and Modified 8 are less than in Alternatives 4 and 6; therefore, the expected reduction in effects is less certain. In particular, the most restrictions on fuel treatments in Alternative 8 and Modified 8 would apply in areas likely to contain concentrations of old forest: habitat associated with the California spotted owl and the fisher. Therefore, Alternatives 8 and Modified 8 would have a higher likelihood of loss of old forest to high severity fire compared to Alternatives 4, 6 or 7, despite their similarity in overall predicted decreases in wildfire acres burned. Alternative 7 would also likely have a higher loss of old forest to high severity fire than Alternatives 4 or 6 because this alternative does not emphasize treatments in concentrations of old forests represented in old forest emphasis areas (as would occur under Alternatives 4 or 6).

Old Forest Ecosystem Functions and Processes. Alternatives 5, 6, and 8 have the greatest emphasis on prescribed burning, and consequently the greatest emphasis on reintroducing fire as a process in old forest ecosystems. Alternatives 5 and 8 have more restrictions on prescribed burning

than Alternative 6. Alternative 6 however provides explicit priority for restoring fire as a process in old forests...different than any other alternative. Alternative 6 has the greatest planned restoration of fire as a process in old forests. Alternatives 1, 4, and 7 have low to moderate amounts of prescribed burning. However, treatment locations rely more on local discretion, so the extent to which these alternatives would restore fire to old forests is unknown. Alternatives 8 and Modified 8 have higher levels of prescribed burning; however, restrictions in this alternative's standards and guidelines limit the extent of prescribed burning and therefore the amount of fire restoration in old forests. Alternative 2 has very little prescribed burning, and thus minimal restoration of fire to old forests.

The alternatives with the highest likelihood of connectivity between large blocks dedicated to old forests are listed in order as follows: Alternative 2, 5, 3, Modified 8, 8, and 6. Alternatives 1 and 4 have moderate-sized blocks dedicated to old forests, but they are widely distributed and more limited in providing connectivity. Alternative 1 has no specific provisions for old forest patches; Alternatives 3, 4, 5, 6, 7, 8 and Modified 8 have provisions for maintaining old forest patches in the general forest that would contribute to connectivity.

Uncertainty. Limited information exists regarding the effects of management on old forest patches (or stands). Hence, alternatives with greater potential for mechanical treatments in old forests have greater uncertainty associated with their potential effects on old forest function. The relative level of uncertainty associated with management effects in old forests is as follows: Alternatives 2 and 5 have low uncertainty; Alternatives 3 and 6 have low to moderate uncertainty; Alternatives 4 and 7 have higher levels of uncertainty. Levels of management in old forests under Alternatives 8 and Modified 8 are limited in the immediate future, and unclear in the longer term.

Aquatic, Riparian, and Meadow Ecosystems

The action alternatives would meet the aquatic management strategy (AMS) goals to varying degrees. Alternatives 2, 5, 6, 8, and Modified 8 would most closely meet the AMS goals because they provide the greatest protection for water quality and riparian, aquatic, and meadow ecosystems. Alternative 4 would provide a reduced level of water quality protection compared to Alternatives 2, 5, 6, 8, and Modified 8 primarily due to the likelihood of high severity wildfire impacts under this alternative. Alternatives 3 and 7 would provide somewhat less protection to riparian areas compared to Alternatives 2, 5, 6, 8, and Modified 8. Alternative 4 would be the least effective of the action alternatives in meeting the AMS goals. All of the action alternatives would more effectively meet the AMS goals than Alternative 1.

Water quality. Emphasis watersheds (Alternatives 2, 6, 8 and Modified 8), aquatic diversity areas (Alternative 5), critical aquatic refuges (Alternatives 2, 6, 8, and Modified 8), and critical refuges (Alternative 5), reductions in road miles, and decreases in wildfire would all contribute to water quality protection. Alternatives 2, 5, 6, 8, and Modified 8 would have the greatest potential to maintain water quality, though Alternative 3 could achieve comparable outcomes through local decisions tied to landscape analyses. Alternatives 4 and 7 follow Alternatives 2, 3, 5, 6, 8 and Modified 8 in terms of maintaining water quality. All action alternatives would have a greater potential than Alternative 1 to maintain or enhance water quality.

Population viability of native species. Alternatives 2, 5, 6, 8, and Modified 8 would have the greatest relative benefit to aquatic species (fish and amphibians) of all alternatives considered, primarily due to the amount of area protected by special aquatic areas, such as emphasis watersheds and critical refuges. Alternatives 3 and 7 would benefit aquatic species slightly more than Alternative

4. Alternative 4 would have the lowest benefit of the action alternatives due to its higher level of treatments. All action alternatives would provide greater protection to native species than Alternative 1.

Plant and animal community diversity. Alternatives 2, 5, 6, 8, and Modified 8 would provide the greatest protection for riparian and meadow plant and animal communities because they limit activities adjacent to watercourses. Alternatives 3 and 7 would provide intermediate levels of protection, and Alternative 4 the lowest level of the action alternatives. All alternatives would provide greater protection to riparian and meadow associated plants and animals compared to Alternative 1.

Special habitats (springs, bogs, and fens). Alternatives 2, 5, 8, and Modified 8 are expected to provide the highest level of protection for special habitats because riparian area widths would be the greatest in these alternatives and equivalent roaded area (ERA) thresholds would limit disturbance in these areas. Alternatives 3, 6, and 7 would provide intermediate levels of protection, and Alternative 1 and 4 would provide the least protection for these areas.

Watershed connectivity. Watershed connectivity would be affected by the alternatives at two geographic scales. At the landscape scale, watershed connectivity would be best supported under Alternatives 2, 5, 6, 8, and Modified 8 because these alternatives designate special aquatic areas (such as critical aquatic refuges). The presence of free flowing, connected river segments was a key criterion used to designate these special aquatic areas in these alternatives. At the site-specific scale, alternatives that minimize mechanical treatments adjacent to water bodies (Alternatives 2, 5, 8, and Modified 8) would best support watershed connectivity, as they would minimize soil compaction and potential soil erosion effects.

Floodplains and water tables. None of the alternatives would specifically restore floodplains and water tables in meadows, although improved livestock grazing practices would prevent channel down cutting and draining of wet meadows. Improvements to floodplains and water tables would result from complex restoration projects that could be conducted under any of the alternatives.

Stream channel and shoreline physical condition. All alternatives would protect streambanks and shorelines from adverse effects associated with wildfires and management activities. Alternatives 2, 5, 8, and Modified 8 provide the greatest protection for streambanks and shorelines based on the combined effects of wildfire and fuel reduction treatments, grazing protection measures, and proposals for mineral withdrawals in critical aquatic refuges and critical refuges. Alternatives 1, 3, 4, 6, and 7 provide slightly less streambank and shoreline protection because these alternatives do not have critical aquatic refuges.

Fire and Fuels

Weather, topography and fuels influence the behavior of fires. All alternatives influence fires in the Sierra Nevada through a fire suppression program and modification of fuels and vegetation. Alternatives 3, 4, 6, 7, Modified 8 would reduce the average annual wildfire acres burned in the first decade after treatments are implemented compared to historical averages over the 27-year period from 1970 through 1996. These alternatives apply the strategically placed fuel treatment approach, but the probability of their effectiveness varies. Alternatives 4, 6, and 7 have landscape structural requirements with flexibility that allows full implementation of the fuels strategy. Modified 8 would have stand level structural requirements that could preclude full implementation of the fuels strategy.

Fire effects are more difficult to estimate; however, the alternatives most likely to reduce acres lethally burned each year by wildfire are (in decreasing order): Alternative 4, 3, 6, 7, Modified 8, 8, 1, and 5, and 2. Alternatives 1, 2, 5, and 8 would result in the greatest number of acres burned annually at lethal levels by wildfire.

Alternatives 1, 3, 4, 6, 7, and Modified 8 would enhance conditions for initial wildfire attack efficiency. Alternative 5, 6, and 8 have the greatest emphasis on fire reintroduction.

Alternatives 3, 4, 6, 7, 8, and Modified 8 would provide the greatest protection property within the Urban Wildland Intermix zone.

Noxious Weeds and Invasive Nonnative Plants

Implementation of an integrated weed management program is common to all alternatives. This program would improve suppression and control of noxious weeds in Sierra Nevada national forests.

Hardwood Ecosystems

Effects of the alternatives on hardwood ecosystems are analyzed in terms of hardwood ecosystem sustainability and biodiversity. Sustainability is a desired condition for hardwood ecosystems, and is affected by the balance between mature tree removal and young tree growth. Hardwood ecosystems support a diversity of plant and animal species; the alternatives differ in how they protect and perpetuate these diverse conditions.

Sustainability in Hardwood Ecosystems

Blue Oak Woodlands. Alternatives 3, 4, 6, and 7 would provide the greatest contribution toward long-term sustainability of blue oak woodlands; they all provide a balance between information gathering and uncertainty while incurring high levels of protection from wildfire. Alternative 3 goes the farthest toward integration of hardwood management at the landscape scale through reliance on landscape analysis. Alternatives 4 and 7 would target stand level analysis on stands most likely to be lacking in regeneration, while Alternatives 3 and 6 would focus on broader scale trends and environmental factors to identify opportunities for restoration projects. Alternatives 8 and Modified 8 are ranked slightly lower because of the inability of these alternatives to reduce wildfire risks. Alternatives 1 and 2 rank lowest in their contribution to blue oak woodland sustainability.

Montane Hardwoods. Alternatives 3, 4, 6, and 7 rank highest in their contribution to montane hardwood sustainability; however, each alternative has different strengths and uncertainties. Alternative 4 provides managers with the most flexibility for applying mechanical treatments and has the highest potential for reducing wildfire. However, Alternative 4 has the highest degree of uncertainty because it has fewer requirements for gathering information about hardwoods and their management. Alternatives 6 and 7 provide both fuels treatments and information gathering. Because of the local flexibility built into Alternative 7, it would have more uncertainty than Alternative 6, though this uncertainty should be balanced against the likelihood that benefits would be increased through local flexibility. The additional reforestation standards in Alternatives 6 and 7 would contribute to sustainability over Alternative 4 by reducing the likelihood that montane hardwood stands would be converted to conifer stands. Alternative 3 would use the most cautious approach, providing many opportunities to gather information, but little opportunity to actively manage hardwood ecosystems and provide needed disturbance. Alternative 8 would require a high degree of

information gathering and provides moderate protection from wildfire, but management is more limited, particularly in suitable California spotted owl habitat. Alternative Modified 8 would require less information gathering, while allowing a greater level of management than Alternative 8. Alternatives 1, 2, and 3 generally rank low to moderate in contributing to montane hardwood sustainability due to fewer information-gathering requirements and generally fewer opportunities for conducting treatments.

Biodiversity in Hardwood Ecosystems

Key concerns for montane hardwood ecosystems are lack of late seral conditions, large trees, and open canopy conditions. Blue oak woodlands appear to have sufficient distribution of canopy cover classes, but numbers of medium and large trees are a concern.

Short-Term Effects. Alternative 6 would retain large trees and snags in the short term, and would allow a moderate level of treatment to develop hardwood stands in the long term. Alternatives 2, 3, 5, and Modified 8 would retain large trees and snags in the short term, but would limit treatment and development of hardwood stands in the long term. Alternatives 1, 4, and 7 would not retain large trees and snags to the same degree as the other alternatives in the short term, and would permit treatments over the greatest area to develop hardwood stands in the long term. Alternative 8 would likely retain large trees and snags in the short term, but long-term effects are uncertain.

Long-Term Effects. Alternatives 6 and 7 would provide the highest degree of maintaining long-term biodiversity of hardwood ecosystems. Alternative 4, which has limited large tree retention standards, ranks lower than Alternatives 6, 7, 8 and Modified 8. Alternatives 2, 3, and 5 rank below the other alternatives due to inability of these alternatives to reduce conifer encroachment, which could result in a long-term loss of hardwood communities. Finally, Alternative 1 ranks below the others because tree retention standards are weak, and the uncertainty of perpetuating hardwood ecosystems is high.

Focal Species

California Spotted Owl

All alternatives show projected increases in quantity and quality of useable habitat available for the California spotted owl across its range. The alternatives are distinguished by differences in the amount of habitat and management of individual owl nest locations and home range areas. Alternative 4 is projected to produce slight declines in high quality California spotted owl habitats, and would not protect all spotted owl nest (or primary roost) stands. Alternative 1 also would not protect all California spotted owl nest stands. Among the remaining alternatives, Alternative 7 is projected to provide lower amounts of useable habitat. Alternatives 2, 3, 5, 6, 8 and Modified 8 protect all California spotted owl nest stands and have the highest projected increase in habitat values. These alternatives should provide positive benefits to California spotted owls to the extent that habitat on national forests limits population numbers. Alternative 2, 5, 8 and Modified 8 limit activities within California spotted owl home ranges to a greater extent than other alternatives, and could provide increased short-term protection. Improved understanding of relationships between habitat patterns at the home range scale and California spotted owl demographics, and application of this knowledge at smaller scales could reduce the risks of implementing any of the alternatives.

Northern Goshawk

Alternatives 3, 5, 6, 8, and Modified 8 would provide the greatest contribution to maintaining and enhancing conditions for northern goshawk throughout the Sierra Nevada. These alternatives would protect all northern goshawk territories and all show projected increases in overall amounts of high suitability habitat. However, there is still uncertainty associated with concluding that these alternatives would provide for a viable population of northern goshawks in the Sierra Nevada.

Alternatives 4 and 7 would provide less certainty because of the high rates of mechanical treatments – however, would provide greater protection from loss to natural disturbance events.

Willow Flycatcher

The alternatives use different approaches for managing and conserving willow flycatcher habitat and populations. All of the action alternatives offer improved approaches compared to current willow flycatcher management strategies used by Sierra Nevada national forests (Alternative 1).

Alternative 1 (Current) is a baseline for comparison of the other Alternatives. Alternatives 2 and 8 provide the greatest improvement of conditions for willow flycatchers during the breeding season as compared to Alternative 1. Given the available data and uncertainties, Alternative 2, which excludes livestock grazing year-round in occupied willow flycatcher habitats, presents the greatest benefits to the species. Of all the action alternatives, Alternative 2 is the most likely to support long-term distribution and abundance of the willow flycatcher in Sierra Nevada national forests. Furthermore, Alternative 2 excludes grazing in meadow habitat within 5 miles of occupied sites, allowing for restoration and potential re-colonization of these sites and the opportunity for willow flycatcher population expansion and recovery.

Alternatives 3, 5, 6, and Modified 8 would provide slightly less improvement of conditions affecting the willow flycatcher than Alternatives 2 and 8. Alternatives 3 and 5 would provide more stringent guidelines than other alternatives regarding general streambank use but weaker protections than Alternatives 2 and 8 specific to willow flycatcher habitat. Alternatives 3, 4, and 7 would provide an equal to slightly greater level of improvement of conditions associated with the willow flycatcher as compared to Alternative 1.

Forest Carnivores

Four forest carnivores of special concern were identified in the notice of intent for the Sierra Nevada Forest Plan Amendment Project: marten, fisher, wolverine, and Sierra Nevada red fox. The marten and fisher are more likely to be directly affected by decisions made from this FEIS than the rarer wolverine and Sierra Nevada red fox, which are associated with higher elevations. Consequences to these species were evaluated in terms of: (1) changes in vegetation structure and composition, (2) recreation and roads, and (3) survey requirements and site protection.

Fisher

Alternatives 5 and 8 would have the greatest improvements to fisher persistence and habitat. Both alternatives would provide fisher habitat through their provisions for retaining and recruiting large trees, snags and coarse woody debris; retaining dense forest canopy; and promoting hardwoods on conifer sites.

Alternative 2 would provide habitat protections similar to Alternatives 5 and 8; however, because Alternative 2 relies primarily on fire suppression to manage the threat of severe wildfires, the risk of catastrophic fire would be higher under this alternative.

Alternative 3 would have less beneficial impacts on fishers in terms of dead and down wood and hardwoods on conifer sites than either Alternative 5 or 8. Under Alternative 6, canopy closure in denning areas could be reduced to 40 percent in developed areas within urban wildland intermix zones.

All of the action alternatives would protect fisher den sites from human disturbance; however, none of the alternatives would reduce road-related risks to the same extent as Alternative 5. Alternative 5 would reduce potential recreation-related impacts in close proximity to fisher locations and would reduce the impacts of roads and related human disturbance by reducing road density and protecting unroaded areas.

Alternatives 4 and 7 would overall provide no change or slight increases to fisher environment and population than the other alternatives. Alternative 4 would result in lower fisher abundance and distribution as it would slightly decrease the availability of habitat elements important to fishers. Alternative 7 would reduce forest canopy from levels associated with denning habitat to levels associated with travel and foraging, but would have no change from the current situation.

Marten

While there are slight differences between Alternatives, in general, environmental conditions and population would not be expected to change significantly from the current condition under any of the Alternatives. All alternatives would retain and develop large trees at sufficient levels.

Under Alternatives 5, 6, and 8, and Modified 8 new recreational developments (for example ski areas) would be evaluated for compatibility with marten needs when they were proposed in suitable marten habitat. In addition, Alternative 5 would reduce the impact of roads and related human disturbance by protecting unroaded areas.

Alternative 2 provides direction for protecting marten habitat; however, this alternative has an increased risk of catastrophic fire, which could have negative effects on habitat for this species. Compared to Alternatives 5 and 8, Alternative 3 could provide less dead and down wood and hardwoods on conifer sites. Alternative 6 does not protect habitat as well as Alternatives 5 and 8 because it would allow canopy closure in denning areas to be reduced to 40 percent in developed areas within urban wildland intermix zones.

Alternatives 1 and 4 would only slightly decrease overall environmental conditions and predicted populations compared to the current condition. Alternative 4 could slightly reduce forest canopy cover because it would establish and maintain both defensible fuels profile zones (DFPZs) and strategically placed area fuels treatments (SPLATs). Alternatives 4 and 7 provide less snag protection, which could lead to lower levels of recruitment of coarse woody debris over time. Alternative 4 has the highest level of fuels treatment and could result in less coarse woody debris recruitment. Alternative 7 emphasizes mechanical treatments over prescribed fire, possibly reducing coarse woody debris recruitment.

Sierra Nevada Red Fox

Although the current distribution of the Sierra Nevada red fox in California is uncertain, the species' range appears to have contracted from the continuous distribution described by Grinnell in the 1930s. Of all the alternatives, Alternative 5 would likely lead towards the greatest improvement to environmental conditions and population for Sierra Nevada red fox, because it provides the greatest level of meadow protection, emphasizes reducing road densities across landscapes, and encourages new Sierra Nevada red fox surveys. Alternatives 3 and 5 propose restrictions on recreational activities in unroaded areas. Alternatives 5, 6 and 8 and Modified 8 would further evaluate recreational development on the basis of Sierra Nevada red fox detections and the presence of suitable habitat. Alternatives 6 and 8 would not require surveys, and these alternatives place fewer restrictions on recreation and roads. Alternatives 4 and 7 would provide more of the open forest habitat preferred by the Sierra Nevada red fox than Alternative 5; however, these alternatives place fewer restrictions on recreation and would provide moderate reductions in roads. Alternative 2 would prohibit OHV and over snow vehicle (OSV) use in den site buffers; Alternative 2 would not require new surveys for the Sierra Nevada red fox.

Wolverine

Consequences to wolverines are primarily influenced by: (1) recreation and roads and (2) survey requirements and site protection. Based on the combined categories, Alternatives 5, 8 and Modified 8 appear to represent the greatest benefit to wolverine persistence and recovery. Alternative 5 and 3 would restrict recreational activities in unroaded areas. Alternative 5, 6, and 8 would evaluate recreational development on the basis of wolverine detections and the presence of suitable habitat. Alternative 5 would emphasize reducing road densities and would encourage new surveys. Alternatives 3 and Modified 8 would not provide the same level of benefits as Alternatives 5 and 8 because they would not require surveys, however they would limit activities around verified wolverine sightings.

All Alternatives would increase the suitability of wolverine habitat from the current condition, ranging from 5.4 to 9.1 percent. Modified 8 would have the greatest increase in suitable habitat. Alternatives 4, and 7 would have only slight increases. However, this variation does not significantly influence conclusions because none of the alternatives substantially affect the vegetation element of wolverine habitat, either as interpreted from the standards and guidelines or from habitat utility values projected by the California Wildlife Habitat Relationships (CWHR) model. Alternatives 1, 4, and 7 would not encourage surveys, and they would have greater potential for new road development than the other alternatives.

Alternative 2 would have more risks related to the effects of roads and survey requirements than Alternative 5, but would generally provide greater benefits to wolverines than Alternatives 1, 4, and 7.

Amphibians

Foothill Yellow-Legged Frog

Alternatives 2, 5, and Modified 8 appear to provide the greatest level of protection to the foothill yellow-legged frog, because they provide the most effective management approaches for these species' persistence and recovery. Alternatives 3, 6, 7, and 8 would provide a slight improvement from the current condition. Alternative 4 would decrease environmental conditions compared with the current condition, but would result in greater benefits than Alternative 1 (No Action).

Alternative 1 would result in lower environmental outcomes for the foothill yellow-legged frog from the current condition. Information and research gaps, especially regarding the impacts of livestock grass and shrub utilization standards on the foothill yellow-legged frog, add uncertainty to this assessment.

Mountain Yellow-Legged Frog

Alternatives 3, 5, 8, and Modified 8 appear to provide the greatest improvements of environmental outcomes for the mountain yellow-legged frog because they provide the most effective management approaches for this species' persistence and recovery. Alternatives 4, 6, and 7 provide less improvement for the mountain yellow-legged frog. All of the action alternatives (Alternatives 2 through 8 and Modified 8) provide significantly greater protection to the mountain yellow-legged frog than Alternative 1, (No Action).

Yosemite Toad

Alternatives 8 and Modified 8 provide the greatest improvement of environmental conditions for the Yosemite toad, because they provide the most effective management approaches for this species' persistence and recovery. Alternatives 2, 3, and 5 provide slightly less improvement, because of lack of specific direction limiting livestock grazing at Yosemite toad sites. Alternative 2 includes provisions for establishing an amphibian reserve system to protect known occupied and suitable unoccupied amphibian habitats (Appendix D standard and guideline AM12). Alternatives 3 and 5 would protect known occupied amphibian habitats, based on records over the last 25 years (Appendix D standard and guideline AM13). Alternative 4 would provide for improvement from the current condition similar to Alternative 1 (No Action).

Cascades Frog and Northern Leopard Frog

Alternatives 5, 8, and Modified 8 appear to provide the greatest improvement of conditions for the Cascades frogs and northern leopard frogs, because they provide the most effective management approaches for this species' persistence and recovery.

Socio-Economic Concerns

Commercial Forest Products

During the first decade, the alternatives are projected to produce between 21 and 534 million Board Feet (MMBF) of live timber annually from the Sierra Nevada national forests. These estimates include 5 years of timber harvest conducted under the pilot project implementing the Record of Decision for the Herger-Feinstein Quincy Library Group Forest Recovery Act. After the first 5 years (upon completion of the pilot project), timber harvests are projected to decline. An assessment of the pilot project would be made following its completion. This assessment could lead to the adoption of

similar strategies throughout the Sierra Nevada. However, at this time, any assumption about assessment results would be speculative. In the second decade, timber harvest volumes in Alternatives 1, 4, 6, 7, and 8 would decline further, as the need for fuel treatments would lessen and treatments would produce lower timber volumes than treatments conducted in the first decade.

Alternative 1 (No Change – Current Management) is a baseline for comparison of the other Alternatives. Alternatives 4 and 7 would produce the most timber volume over the first decade, about 120 to 128 percent of Alternative 1. Alternatives 3, 6, and Modified 8 would produce a timber volume, about 25 to 30 percent of Alternative 1. Alternatives 2, 5, and 8 would produce the least timber volume, about seven to 15 percent of Alternative 1. Alternatives 4 and 7 would continue to produce the most timber volume during the second decade and Alternatives 2, 3, 5, and 8 would produce the least.

Grazing

Grazing use levels

Alternatives 1, 4, and 7 would cause the least reduction in grazing use. Alternatives 2, 5, 8, and Modified 8 would cause the greatest reductions in grazing use. Alternative 3 would cause a reduction that would be higher than Alternatives 1, 4, and 7, but lower than Alternatives 2, 5, 8, and Modified 8. The reduction in grazing use under Alternative 6 would be higher than Alternative 3, but lower than Alternatives 2, 5, 8, and Modified 8.

Acres Available for Grazing

Alternatives 1, 4, and 7 would have more suitable rangeland (acres available for grazing) than Alternatives 2, 3, 5, 6, 8, and Modified 8. Suitable rangeland acres under Alternative 8 and Modified 8 would be similar to those for Alternative 5, and more than those provided in Alternative 2. Alternatives 2 and 5 would provide the least amount of suitable rangeland acres for grazing.

Animal Unit Months

All alternatives, including Alternative 1, show a decrease in Animal Unit Months (AUMs) offered by the national forests from allotments in the Sierra Nevada compared to current conditions. Implementation of existing forest plan standards and guidelines over the past 10 years has resulted in reduced numbers of livestock grazing. Other factors that have affected grazing levels include implementation of management requirements for threatened and endangered species and water quality standards.

Alternatives 2, 5, 8, and Modified 8 would establish more conservative standards and guidelines related to grazing activities than the other alternatives. These standards and guidelines would remain in effect until a range analysis could be completed to determine the condition of the range. In many cases, these conservative standards would make it uneconomical for permittees to graze their allotments while waiting for an analysis to be completed. Since it would take many years to complete the analysis on several hundred allotments, it is assumed that many permittees would give up their permits.

Mining

Alternative 1 represents no changes to existing forest plans. Mining activities would change in the future under Alternative 1 as ongoing Forest Service management would continue to include proposals for mineral withdrawals and mitigation for natural resource protection.

Alternatives 3, 4, and 7 are similar in that they do not contain proposals for new mineral withdrawals. Alternative 7 has the least Known Mineral Deposit Area (KDMA) acreage and fewest mining claims in restrictive land allocations; Alternative 3 has the most; and Alternative 4 falls between Alternatives 3 and 7 in terms of acreages in KDMAs and numbers of mining claims affected by mining restrictions. Overall, differences between these three alternatives do not appear to be significant. However, impacts from Alternative 3 are less certain because withdrawals and mitigation measures would be based on findings in landscape analyses.

Alternatives 2, 5, 6, 8, and Modified 8 propose new mineral withdrawals. Alternative 2 proposes withdrawals of up to 75 percent of the Sierra Nevada national forests' acreage in KMDAs and 78 percent of the active claims. Alternative 5 proposes withdrawals of up to 45 percent of the Sierra Nevada national forest's acreage in KMDAs and 40 percent of the active claims. Alternatives 6, 8, and Modified 8 propose withdrawals of up to 11 percent of the national forest's acreage in KMDAs and 9 percent of the active claims.

Alternatives 6, 8, and Modified 8 are slightly more restrictive to mining than Alternatives 4 and 7 and likely less restrictive than Alternative 3. Alternatives 2 and 5 would have the greatest impacts to mining due to the large amounts of land and high numbers of active claims affected by potential withdrawals. In addition, the level of constraints in riparian areas under Alternative 5 could withdraw mining operations in these areas.

Roads

The forest development road arterial system would remain in its current location in all alternatives. No arterial roads would be decommissioned. Improving arterial roads would continue to be a priority for road construction funding.

The forest development road collector system would also remain in its current location. Construction or decommissioning of collector roads would be unlikely. Collector roads would be improved and managed to provide a more stable road surface, primarily using gravel and dust abatement.

The most dramatic change in the forest development road system would be changes in the mileage and conditions of local roads. Some roads would be improved to reduce impacts on adjacent resources, but typically these roads would have lower maintenance priority. It could become impossible to drive on some local roads due to vegetative encroachment. There would be fewer miles, as some local roads would be decommissioned.

There would be fewer miles of unclassified roads. Unclassified roads would be evaluated as they were found. Some unclassified roads (those supporting unauthorized uses) would be decommissioned. Others providing needed access would be added to the forest development road system. In some areas the size of the forest development road system could actually increase as needed roads were added to the system. If these roads were supporting authorized uses, adding them to the forest development road system would not affect existing public access.

Air Quality

Particulate emissions from prescribed burning would contribute to PM₁₀ loading; however, analysis indicates that activities proposed in the alternatives would not likely create conditions that violated Ambient Air Quality Standards. Alternatives 6, 8, 7, 3 and 4 would likely have short-term noticeable increases in emissions from prescribed burning to reduce forest fuels. These treatments could however lead to long-term reductions in emissions from wildfires. Alternatives to burning, such as mechanical treatments, would be expected to reduce wildfire emissions over the long-term.

Remote communities use firewood for household heating. Combined with prescribed burning, this could aggravate the background levels of PM₁₀ and PM_{2.5} during winter and early spring.

Short-lived unpleasant odors and reduced visibility (in 15 Class I Areas) could be detected by wilderness visitors and could affect the recreational experience of those trying to seek solitude and escape signs of human activity.

The amount of ozone produced is unknown. Ozone production would not vary among the alternatives because the major sources are located outside national forest boundaries. The amounts of NO_x (precursor to ozone formation) produced per project are small. The highest potential for risk of injury to plants (ponderosa pine and Jeffrey pine) from ozone is in those plant communities already stressed by drought, insect and pathogen attacks, and soil acidification. The alternatives that resulted in less acreage of diseased trees would be able to withstand higher amounts of pollution. It is difficult to quantify the effects of N deposition and ozone concentration on old forests, hardwood ecosystems, noxious weeds, aquatic and riparian ecosystems, and other flora and fauna with the available research.

Visual Quality

In the first decade, Alternative 4 would have the greatest number of effectively altered acres. Alternatives 2 and 8 would have the fewest acres altered by management activities. Alternatives 3, 5, 6, 7 and Modified 8 would fall between these alternatives in terms of acreage that would be visually apparent due to management activities. Local visual quality could be impaired for a time in alternatives that result in higher levels of lethal wildfire effects (Alternatives 1, 2, 3, 8, and Modified 8).

Recreation

In general, all of the action alternatives could have localized effects on certain types of recreation activities on national forest lands. Alternative 1 represents no changes to existing forest plans. Alternatives 2, 3, 5, 6, 8 and Modified 8 would provide for between 85 and 90 percent of recreation visitor days (RVDs) compared with Alternative 1. These alternatives favor a trend toward more dispersed, non-motorized recreation, such as hiking and backcountry camping. Alternatives 4 and 7 would maintain the level of RVDs compared with Alternative 1.

Socioeconomic

The level of active management in each alternative directly affects the socioeconomic climate of the Sierra Nevada through county revenues, employment, and income derived from resource extraction, production, and use. Receipts from timber sales on national forest lands can provide revenues to affected counties for roads and schools. Timber harvest from national forest lands provides a flow of

products to area industries. Short-term economic effects vary with the level of resource extraction. Alternative 4 would have the greatest direct economic benefit, while Alternative 2 would have the lowest in the short-term. Long-term direct and indirect economic effects could be associated with sustaining ecosystems to benefit the broader California population that may exceed 60 million people by mid-century.

Forest Service Budget Projections

Each alternative entails different costs for funding programs in fire and fuels management, vegetation and timber management, landscape analysis and monitoring. Total costs for the latter two programs; landscape analysis and monitoring, are predicted to be relatively small compared with costs of running the other programs under all alternatives. Total costs for alternative implementation would be highest in Alternative 4 and lowest in Alternative 2. Alternatives 4 and 7 exceed the total annual budget of 200 million for the 11 Sierra Nevada national forests. The Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project would likely increase costs disproportionately in the first 5 years of implementation under all alternatives.

Summary Table: Comparison of Alternatives

Treatments, outputs, and selected environmental, social and economic consequences are displayed by alternative to allow easy comparison.

Effect on Wildfire. Over the last 30 years Sierra has averaged about 47,000 acres of wildfire per year. In the last ten years, the average has risen to about 76,000 acres per year. It will take at least two decades of fuels treatments before we expect significant changes in wildfire. Because we want to reintroduce fire as an ecosystem process, the reduction in fire severity is more important than the reduction in total acres burned by wildfire.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Annual acres of wildfire, 1 st decade	68,793	68,561	65,804	61,730	69,008	65,705	64,800	67,002	66,079
Annual acres of wildfire, 5 th decade	70,495	76,315	48,381	44,380	71,933	49,579	49,340	62,988	57,575
Percent change in annual wildfire acres from 1 st decade to 5 th decade	2%	10%	-36%	-39%	4%	-33%	-31%	-6%	-15%

Effect on Air Quality. Fuels treatments, both mechanical and prescribed fire, can reduce the amount of particulate from wildfires and from prescribed burns. In addition, timing of prescribed burns helps reduce particulate emissions during periods of critical air quality.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Annual wildfire PM ₁₀ emissions (tons), 1 st decade	24,900	25,300	24,300	22,800	25,500	24,200	24,000	24,700	24,700
Annual prescribed fire tons of PM ₁₀ emissions (tons), 1 st decade	10,100	3,500	12,600	11,900	9,200	18,100	13,900	14,500	6,900
Total annual PM ₁₀ emissions (tons), 1 st decade	35,000	28,800	36,900	34,700	34,700	42,300	37,900	39,200	31,600

Fuels Treatments. The following tables summarizes the estimated fuels treatments to be accomplished by each Alternative.

Source: SPECTRUM runs

Mechanical

	Years: 2001 – 2010								
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Annual acres of mechanical fuels treatment, all Sierra Nevada National Forests	71,826	7,022	30,081	86,168	9,858	33,381	70,045	13,867	68,928

Prescribed Fire

	Years: 2001 – 2010								
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Annual acres of prescribed burn, all Sierra Nevada National Forests	45,280	15,457	53,582	46,760	39,356	82,747	60,113	69,038	25,252

Principal Forest Products. Estimated offering. The period 2001-2010 includes treatments under the HF-QLG Pilot Project. During the six years (1988-1993) preceding the 1993 CASPO Interim Guidelines, the average timber offered for sale (green plus salvage) was 879 million board feet (mmbf) per year; amount sold was 765 mmbf/yr. The average amount of timber offered during the six years since the CASPO Guidelines, 1994-1999, was 372 mmbf/yr.; amount sold was 179 mmbf/yr.

	Years: 2001 – 2010								
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Salvage timber to offer for sale, mmbf/yr, all SNFP National Forests	127	17	33	238	29	91	142	42	91
Estimated green timber to offer for sale, mmbf/yr, all SNFP National Forests	385	22	84	534	49	80	414	33	96
Total	512	39	117	772	78	171	556	75	187

Principal Forest Products (continued). The following table summarizes the estimated amounts of Woody Biomass by each Alternative.

Source: SPECTRUM runs

Years: 2001 – 2010

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Chips, 1000 tons/yr	556	66	244	620	171	291	668	172	358

Grazing/Forage. There are presently 7,165,000 acres of national forest in active grazing allotments and 412,734 animal unit months (AUMs). This table illustrates the estimated reduction of livestock AUMs for the Sierra Nevada National Forests by alternative.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Total Estimated Reduction in active AUMs	-37,000	-140,000	-69,000	-56,000	-172,000	-72,000	-56,000	-110,000	-83,000

Economy. During the five years preceding the 1993 CASPO Interim Guidelines, the average annual receipts to counties were \$48.9 million. The average annual receipts to counties during the years 1994-1998 were \$27.8 million.

Years: 2001 - 2010

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Receipts to counties, Millions of 1995 \$ *	28.5	4.3	9.0	43.7	6.2	8.7	36.1	5.1	9.4
Estimated total annual jobs for Loggers, Timber Haulers, and Timber Mill Employees generated from Forest Service commercial logging operations in the Sierra Nevada Region.	2,164	145	566	3,467	322	526	2,730	222	1,140
Total number of jobs (direct, indirect, and induced) generated by recreation spending within 50 miles of Sierra Nevada national forests	144,201	138,569	137,162	144,201	134,753	139,976	144,201	137,162	137,162

* See Section 6.3 for discussion on Payments to Counties.
Source: IMPLAN Professional 2.0 – baseline year 1997

USFS Budget. The differences in annual budget between alternatives are related to amounts of fuels treatments, timber harvest and watershed analyses.

	Years: 2001 - 2010								
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Annual budget, Millions of 1995 \$, all SNFP National Forests	193.7	144.6	170.5	236.8	159.3	182.0	212.4	164.6	185.9

Old Forest Conservation. Alternatives 2- Modified 8 present a range of approaches to increasing the amount of old forest ecosystems. Important measures of old forest condition are the number of individual large trees, patches of large trees with additional old forest characteristics, and the connectivity or relationship among the trees, patches and larger stands of old forest.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Amount of large or old trees	The amount of large and/or old trees is expected to increase under all alternatives. Alternatives 2,3,5,6,8 & Mod 8 prohibit harvest of large trees. Alternatives 1, 4, & 7 only harvest large trees if they are in excess of those needed for wildlife habitat.								
Percent change in number of large trees, 2nd decade	+5.3	+4.7	+4.5	+3.3	+5.2	+5.1	+3.7	+5.7	+5.5
Maintenance or development of Old Forest Patches	Uncertain due to increased wildfire.	Greatest increase-may be offset by wildfire losses	Uncertain due to increased wildfire	Increase distribution of patches, old forest emphasis areas, decreased wildfire	Greatest increase - old forest emphasis areas	Increase distribution of patches, old forest emphasis areas, decreased wildfire	Uncertain Due to undefined distribution of patches	Greatest increase-may be offset by wildfire losses	Increase distribution of patches, old forest emphasis areas, decreased wildfire
Connectivity of Old Forest trees, patches and stands	No provision for old forest patches	Largest blocks dedicated to old forests	Large blocks dedicated to old forests. Amount and distribution determined at the project-level.	Maintain 20% by watershed in old forest patches	Largest blocks dedicated to old forests. Protects remnant patches >5 acres.	Large blocks dedicated to old forests. 50% by watershed in old forest patches.	Moderate size blocks dedicated to old forests. Amount and distribution determined at the project-level.	Large blocks dedicated to old forests, extent determined through analysis of habitat needs.	Large blocks dedicated to old forests, extent determined through analysis of habitat needs.
Acres of old forest emphasis areas	318,000	NA	1,337,000	713,000	1,745,000	1,605,000	NA	2,319,000	1,636,000
Acres of Integrated Biodiversity Reserves	NA	4,873,000	NA	NA	NA	NA	NA	NA	NA

NA = alternative does not include this land allocation.

The following table characterizes the degree of confidence about the alternatives reducing fuels and not damaging resource values. The judgment is based mostly on the degree to which the alternative employs strategic fuels treatments using mechanical and prescribed fire, and implementing the treatments in the “right place at the right time.”

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Mod 8
Degree of confidence that treatments will have the desired effects on fuels, reducing wildfire extent and severity	Low no strategic approach to fuels treatments	Low no strategic approach to fuels treatments, relies mostly on suppression	Low fuels strategy would be determined on watershed rather than larger landscape scale	High strategic approach to fuels treatments	Low lacks strategic placement of fuels treatments	High strategic approach to fuels treatments. Landscape scale structural requirements allow fuel treatments to be fully implemented	High strategic approach to fuels treatments	Moderate strategic fuels treatments. Limits use of mechanical treatments. Stand level retention of old forest structure may not allow fuels treatments to be fully implemented	High strategic approach to fuels treatments
Degree of confidence that there will be no adverse effect on old forest habitats	Low wildfire losses are likely to increase	Low wildfire losses are likely to increase	Low to moderate little risk of mechanical treatments affecting resources, but possibility of losses to wildfire	Low concern that extensive reliance on mechanical treatment will damage resource values	Low wildfire losses are likely to increase	Moderate to high includes emphasis areas to protect special resource values	Low concern that extensive reliance on mechanical treatment will damage resource values	Moderate to high includes emphasis areas to protect special resource values	Moderate to high includes emphasis areas to protect special resource values

Uncertainty. An important difference among alternatives is the uncertainty about the effectiveness of fuels treatments on reducing the extent and severity of wildfire. The popular belief is, generally, mechanical treatments are more certain to reduce fuel loading than the use of prescribed fire only. In addition, the use of prescribed fire without associated mechanical treatments is believed to increase the chance of escaped fire and adversely affect wildlife habitat for species associated with old forest ecosystems. Conversely, there is concern among some that wide scale use of mechanical treatments is a greater threat to habitat than wildfire. There is more uncertainty about implementing fuels treatments under alternatives that have specific stand level retention standards for old forest structural elements. When these elements are retained at a larger, watershed or landscape, scale there is more flexibility, and therefore, higher likelihood of being able to implement an effective fuels strategy.