

Revised Draft Land Management Plan for the Sierra National Forest

Fresno, Madera, and Mariposa Counties, California



Cover: Image of Bass Lake, Sierra National Forest.

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Fresno, Madera, and Mariposa Counties, California

Responsible Official:

Dean Gould
Forest Supervisor
Sierra National Forest
1600 Tollhouse Rd.
Clovis, CA 93611
(559)297-0706

For more information contact:

Judith Tapia
Forest Planning Officer/Business Manager
(559)297-0706 ext. 4938

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Chapter 1. Introduction

Location

The Sierra National Forest is one of 18 national forests in California. It is located on the western slope of the central Sierra Nevada mountain range (figure 1), covering approximately 1.3 million acres within eastern portions of Mariposa, Madera and Fresno Counties. There are about 102,000 acres of private, state, county and other land ownerships embedded within the boundaries of the Sierra National Forest. Other Federal land managers in the region include the National Park Service, Bureau of Land Management and Army Corps of Engineers.

The Sierra National Forest Supervisor's Office is located in Clovis, California. The Sierra has two administrative ranger districts, Bass Lake Ranger District and High Sierra Ranger District.

Distinctive Roles and Contributions of the Plan Area

The Sierra National Forest is known for its spectacular mountain scenery and abundant natural resources, defined by deeply carved river valleys, high elevation lakes, towering conifers, and huge granite monoliths. Elevations vary from 900 feet at Pine Flat Reservoir, to nearly 14,000 feet at the summit of Mount Humphreys along the Sierra Crest. The combination of extreme elevation changes with the variability in aspect and slope, variety of geology and soils, and the amount and timing of precipitation creates a high diversity of ecosystems, ranging from grasslands to subalpine meadows.

At the lowest elevations, rising above the valley floor is the foothill zone. The foothill zone contains rolling foothills dotted with oaks, foothill pine, and extensive areas of a unique mixed chaparral type found only on the Sierra National Forest. Above the foothill zone is the montane zone, dominated by ponderosa pine and mixed conifer forests. Next, the upper montane zone is comprised of a mosaic of red fir forests, open Jeffrey pine woodlands, meadows, and montane chaparral. At the highest elevations, the sparsely vegetated subalpine and alpine zones occur. Massive areas of rock outcrops occur throughout all of these vegetation types.

These varied ecosystems are inhabited by over 1,400 plant species (with herbaceous plants contributing greatest to plant species richness) and approximately 350 fish and wildlife species. The Sierra's terrestrial and aquatic plant and animal species are dependent on resilient ecosystems that also sustain a social and economic fabric connected to a healthy forest.

Wildland fire has been a vital part of the Sierra Nevada for centuries. Many of the ecosystems that make up the Sierra National Forest have been shaped by the way fire moved across the landscape in the past. The lack of fire in the ecosystems in recent history has led to ecosystem changes.

The Sierra National Forest is a recreation destination with intensely used and highly developed lakes and the world famous Ansel Adams and John Muir Wildernesses. The Sierra National Forest provides extreme ends of recreation settings: wildlands, transitional landscapes, lakes recreation and scenic corridors. The wildlands setting consists of picturesque "destination" wilderness areas that provide nationally recognized trails such as the John Muir and Pacific Crest Trails. Nearly 50 percent of the national forest is wilderness, offering solitude and vast open space as part of one of the largest contiguous blocks of wilderness in the continental United States. At lower elevations, the transitional front-country, or forest-urban transition landscapes,

offer year round recreation opportunities within a mixed ownership pattern. These sharp contrasts provide destinations for visitors to escape from the intensity of urban life, and connect with nature, family, and friends.

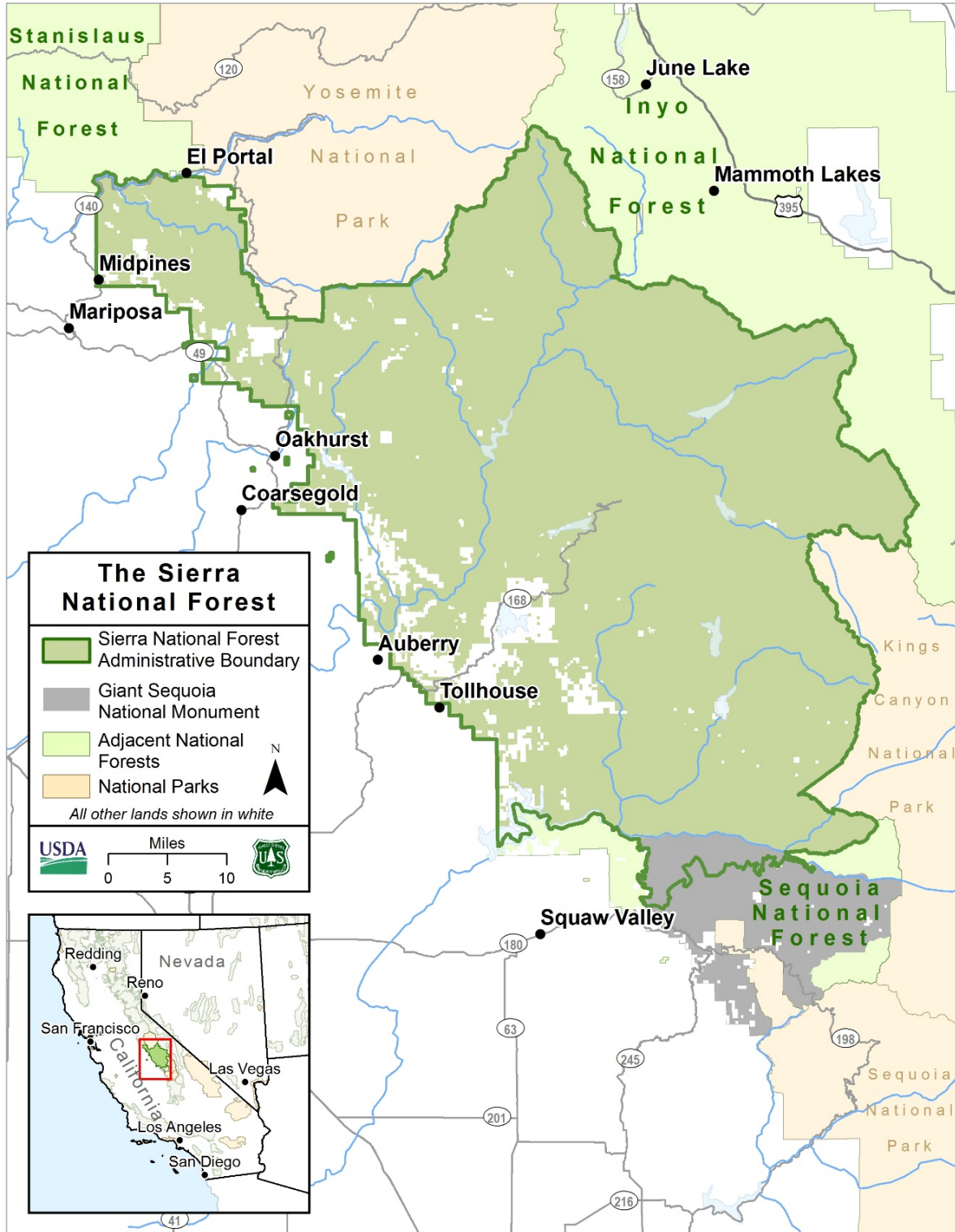


Figure 1. Location of the Sierra National Forest and vicinity

Large lakes (such as the low-elevation Bass Lake that attracts the highest number of visitors, or Huntington Lake, a high alpine lake) define the lakes recreation setting that provides shaded landscapes and opportunities to escape from the heat in the valleys. Lakeshores accommodate intensive developed recreation, while natural settings provide visitors a connection to the expansive wild areas that are within view.

In the scenic corridors setting, popular paved driving and scenic corridors, like the Sierra Vista and Sierra Heritage National Scenic Byways, are the conduit for connecting people from low-elevation urban settings to cool, high-elevation solitude. These corridors provide dramatic geology and historic and vegetative contrasts, including an intimate experience with giant sequoias. The Sierra National Forest offers outstanding opportunities for active outdoor recreation visitors including whitewater rafting, climbing, sailing, off-highway vehicles, over-snow vehicles, mountain biking, skiing and other forms of dispersed recreation. These activities occur at highly specific locations on the landscape, leading to deep attachments for this community of visitors.

The resulting tourism from recreational opportunities on the Sierra National Forest is also important in contributing to the economic sustainability of local communities. Visitor spending supports jobs in local businesses and contributes to county sales tax revenues that local governments use to provide important public services for local communities. The Sierra is within a 4-hour drive of nearly half of more than 37 million people who make their homes in California. This populous pool of potential visitors is one of the most ethnically diverse in the world, challenging the Sierra National Forest staff to look at nontraditional methods of providing service.

The Sierra National Forest is bordered by Yosemite National Park and the Stanislaus National Forest to the north, the Inyo National Forest and Sequoia and Kings Canyon National Parks to the east, and the Sequoia National Forest to the south (figure 1). In conjunction with these lands, the Sierra forms one of the most active recreation areas in the world and as a result receives nearly 1.5 million visitors per year.

The San Joaquin Valley and foothills, located to the west, are mostly rural and agricultural in character and have historic and current economic and cultural ties to the commodities that are produced on the national forest. In addition, the San Joaquin Valley is home to urban centers with a growing and increasingly diverse population that is seeking new and evolving recreational opportunities. Within this ecological, social, and economic landscape, the Sierra National Forest contributes a variety of benefits including 11 major reservoirs that provide recreational opportunities, water for consumption, the generation of hydroelectric power, and irrigation to the rich farmlands of the San Joaquin Valley. Grazing areas and harvested timber also play key roles in supporting the local economy, as well as sustaining a healthy and diverse forest. While the Sierra has substantial commercial value for the people of California, with its rolling oak-covered foothills and beautiful alpine slopes, it is the unique terrain that draws visitors.

The lands and people surrounding the Sierra National Forest have an important influence on how the national forest is managed. Native Americans have inhabited these areas for thousands of years and their diversity, longevity, and importance in the region result in deep cultural ties to the national forest and surrounding lands. The Sierra National Forest lies in the traditional territories of five federally recognized Tribes, as well as four unacknowledged Tribes, tribal groups and organizations. Tribal communities are contacted and consulted, and are important partners in national forest management activities.

Much of the Sierra National Forest is covered in snow during the winter months, but it is influenced by the same Mediterranean climate common to most of California in the summer. With 3 primary rivers, 469 lakes, 11 reservoirs, and countless streams, the Sierra is a popular destination for summer water-sport enthusiasts. In the winter, snowboarding and skiing (both downhill and cross-country) remain popular, while snowmobile and all-terrain-vehicle use is increasing. The outdoor recreation creates economic benefits by serving as a draw for businesses and high-skill workers.

The Sierra National Forest is also a source for timber, with a rolling average timber volume sold of 12,510 thousand board feet between 2008 and 2012. This timber production supports three sawmills in the small communities of Terra Bella, Chinese Camp and Standard. The Terra Bella mill is especially reliant on the Sierra, as it is the last remaining sawmill located south of Yosemite National Park in California.

Grazing has occurred on the rangelands of the Sierra National Forest since the late 1800s. Livestock grazing continues to be one of a variety of multiple uses that contributes to the economic and social well-being of people. Grazing provides opportunities for economic diversity and promotes stability for communities that depend on range resources for their livelihood. Rangelands meet public needs for interrelated resource uses by providing livestock forage, wildlife food and habitat, outdoor recreation and other resource values dependent on range vegetation.

Cultural opportunities are also an important contribution of national forest lands. Tribal communities benefit socioeconomically through the use of cultural resources for artisan and craft materials, medicinal purposes, fuel, and traditional foods, and by supporting heritage tourism and recreation. Cultural resources on the Sierra National Forest also enhance the sustainability of tribal communities by providing opportunities for traditional ceremonies and religious practices that strengthen the community's sense of place and self. Gathering activities on the national forest play an important role in contributing to social, economic, familial, and religious benefits. Native American areas for gathering and distributing wealth and resources on the Sierra National Forest include sedge beds, sour berry patches, meadows, elderberry patches and black oak groves. Among the general public, the young bracken fern fronds are used in several types of Asian cuisine by residents of the Central Valley.

While many visitors enjoy the opportunities the Sierra National Forest provides, there are many people that call the national forest their home. Most private property is concentrated around small residential communities that have grown within or adjacent to the Sierra National Forest over time. There are also isolated private properties scattered throughout the national forest that support ranching interests, isolated residences, and second homes. Reducing fire hazards to adjacent lands and communities is a key contribution of the Sierra National Forest to local communities. Wildfires are actively suppressed on national forests when needed to protect key resources and to prevent intrusion of dangerous fires into communities. Tools to reduce hazardous fuels and maintain fuel conditions include wildland fires managed to meet resource objectives, prescribed burning and mechanical treatments.

Annually, around 800 billion gallons of clean water flows from the Sierra National Forest into the San Joaquin River in the north, and the Kings River in the south. These rivers fill 11 reservoirs that are within or next to the Sierra National Forest and that ultimately supply water and power to the populations, farms, and industries of the San Joaquin Valley. This contribution of the national forest is critical to supporting the economic and social sustainability of jobs, rural culture, and quality of life. Free-flowing rivers also provide crucial benefits for recreation and regional

ecology. There are also benefits to people living outside of the San Joaquin Valley who value the commodities obtained from continued agricultural production in the area, one of the most diverse and fertile agricultural areas in the world.

With the combined benefits of reducing the risk of catastrophic fire, and providing a key component to the local economy, the Sierra National Forest implements a successful and strategic vegetation management program. While this program is a vital stimulant to local industry, it is equally important to increasing the overall health of the forest. All resources that are currently being made available to the Sierra for this program are being used every year. Under the current planning decisions and allocated funding, the vision for this program is developed by way of collaborative groups, with both the Bass Lake Ranger District and High Sierra Ranger Districts consulting with a multitude of stakeholders on a regular basis. This collaboration is now more important than ever as the Sierra National Forest and neighboring communities work together to tackle the massive tree mortality in the region.

The benefits from all national forest contributions provide tremendous ecological, social, and economic value. Some national forest benefits are more easily appreciated than other benefits. For example, national forest recreation, economic and cultural opportunities, and a clean water supply are enjoyed and appreciated directly by people and communities as a whole. Other vital forest ecosystem services provide benefits like biodiversity that are less apparent in our daily lives, but are important because they support and regulate ecosystems and social environments. The term “value“ as used here, represents something more inclusive than a monetary value to capture the idea that all contributions of the Sierra National Forest, even when they are not directly relatable to dollars that are spent or received, still contribute significantly to improving the quality of our lives.

Purpose of the Forest Plan

Every national forest managed by the Forest Service is required to have a land management plan (forest plan) that is consistent with the National Forest Management Act of 1976 (16 U.S.C. 1604) and other laws. The National Forest Management Act directs that these plans be amended as necessary and revised within 15 years. Forest plans are one of three levels of planning and decision-making that guide how we manage National Forest System lands.

The first and broadest level of planning occurs at the national level through the Forest Service Strategic Plan, a 5-year plan that allows public transparency of the agencies goals, objectives and accomplishments. The second level of planning occurs at the level of National Forest System administrative units through forest plans. The third level of planning includes development of on-the-ground projects and activities, which are designed to achieve the desired conditions and objectives of the forest plan. Projects and activities must be consistent with the forest plan.

Forest plans are intended to be strategic, meaning they identify long-term or overall desired conditions and provide general direction for achieving those desired conditions. Forest plans focus on outcomes, and are flexible to allow management to adapt to local conditions. Generally, forest plans are not tactical and do not specify particular methods that must always be used and do not require resources to be allocated. Forest plans emphasize strategic decisions about “why” and “what,” and to a lesser extent, “when” and “where.” The “how” decision is generally made at the tactical or project planning level, and includes a set of site specific details of time, place and circumstances of a particular project proposal.

Forest plans themselves do not compel any action, authorize projects or activities, or guarantee specific results. A project might be needed because of a discrepancy between current conditions and desired conditions. Projects may be proposed in response to demands by the public or to respond to forest plan objectives. When a project is proposed, it is first checked against the suitability of areas. If the project is an appropriate use, then relevant design criteria, standards and guidelines are used. The proposed action for the project is then analyzed using appropriate National Environmental Policy Act procedures. If the project is not consistent with the forest plan, the project may be redesigned or rejected, or a forest plan amendment may be considered. After the project is completed, it is evaluated against forest plan desired conditions and objectives.

A forest plan guides and constrains Forest Service personnel, not the public. Any constraint on the public can only be imposed by law and regulation, or through an order issued by a Forest Service responsible official.¹ In addition to forest plans, management of National Forest System lands is guided and constrained by laws and regulations, and policies, practices, and procedures that are in the Forest Service Directive System. These are generally not repeated in forest plans.

Adaptive Planning

Forest planning is a continuous process that includes a framework of assessment, plan development, amendment, revision and monitoring. The intent of this forest planning framework is to create an integrated approach to the management of resources and uses, incorporate the landscape-scale context for management, allow the Forest Service to adapt to changing conditions and improve management based on monitoring and new information.

An adaptive forest plan recognizes there is always uncertainty about the future of natural systems and the timing and type of disturbances. Social conditions and human values regarding the management of national forests are also likely to change. Because the setting for managing a national forest changes over time, the forest plan incorporates an effective monitoring program, capable of detecting change, with an adaptive flexibility to respond to those changes. The forest plan monitoring program asks key management questions and identifies measurable indicators that can provide answers about change. When conditions change beyond what was anticipated in the forest plan, a responsive process using narrow amendments can adjust plans between revisions.

The planning framework creates a structure within which land managers and partners work together to understand what is happening on the land. It is intended to establish a flexible forest plan that allows national forest staff to adapt management to changing conditions and improve management based on new information and monitoring.

Plan Structure

In chapter 1 we have introduced the Sierra National Forest plan area, distinctive roles and contributions, and described the purpose and structure of a forest plan.

Chapters 2 and 3 provide plan components that establish the framework for integrated resource management and for guiding project and activity decisionmaking. Plan components that apply forestwide or to lands of specific character are located in chapter 2. Plan components that apply to specific mapped parcels of land are located in chapter 3. Plan components include desired

¹ See 36 CFR part 261, Subpart B - Prohibitions in Areas Designated by Order.

conditions, objectives, goals, suitability of lands, standards, and guidelines. See the next section for definitions of plan components and further details on where plan components apply.

Chapter 4 describes the plan monitoring program that forms the basis for continuous improvement and provides information for adaptive management of the plan area. The purpose of monitoring in an adaptive management framework is to facilitate learning to support decisions on necessary changes to the plan. The plan monitoring program consists of a set of monitoring questions and associated indicators to evaluate whether plan components are effective and appropriate and whether management is effective in maintaining or achieving progress toward desired conditions and objectives for the plan area.

The appendix section includes the following: maps (appendix A), proposed and possible actions (appendix B), a strategy for a renewed partnership focus for the Sierra National Forest (appendix C), management strategies for resolving recreation resource conflicts (appendix D), timber suitability (appendix E), and an aquatic and riparian conservation strategy (appendix F).

Plan Components

An integrated plan means that all plan components work together toward achieving or maintaining desired conditions and are internally consistent. The plan components work together as a whole to meet the requirements of the 2012 Planning Rule (36 CFR 219.8 through 219.11), but this does not mean that all uses must be provided for on all lands.

This plan includes six plan components that guide future project and activity decision making. Five plan components are required: desired conditions, objectives, suitability of lands, standards, and guidelines. Goals are included as an optional plan component. These six plan components, along with other plan content, are organized in chapters 2, 3, and 4 as described above. The six components are described as follows:

A **desired condition** is a description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. A desired condition description is specific enough to allow progress toward achievement to be determined but does not include a completion date.

An **objective** is a concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions. Objectives are based on reasonable foreseeable budgets. It is important to recognize that objectives in this plan were developed considering historic and expected budget allocations as well as professional experience with implementing various resource programs and activities. It is possible that the Forest could either exceed or not meet an objective based upon a number of factors, including changes in budget and staffing, planning efficiencies, partnership opportunities, and resource conditions across the plan area (for example, as a result of wildfire or drought).

A **goal** is a broad statement of intent, other than desired conditions, usually related to process or interaction with the public. Goals are expressed in broad, general terms, but do not include completion dates. Goals may be used to describe overall desired conditions of the plan area that are also dependent on conditions beyond the plan area or Forest Service authority. Goals may be used in lieu of objectives if the outcome is the result of a partnership between the Forest Service and other land owners within the broader

landscape, or if the outcome is uncertain, because it could be beyond the fiscal capability of the unit. A goal is an optional plan component.

The **suitability of lands** is determined for specific lands within the plan area. The lands are identified as suitable or not suitable for various uses or activities based on desired conditions applicable to those lands. The suitability of lands is not identified for every use or activity. If certain lands are identified as not suitable for a use, then that use or activity may not be authorized. Appendix E identifies lands that are not suitable for timber production.

A **standard** is a mandatory constraint on project and activity decision-making, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

A **guideline** is a constraint on project and activity decision-making that allows for departure from its terms, so long as the purpose of the guideline is met. Guidelines are established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

Plan components apply forestwide, to lands of specific character, or to specific parcels of land. Plan components for lands of specific character—such as vegetation types or California spotted owl protected activity centers—apply where the characteristics that define these lands exist on the national forest, which can naturally change over time. Plan components that apply to specific mapped parcels of land include management areas and designated areas. The boundaries of management areas and designated areas are static, unless changed through statutory or administrative procedures. A management area is an area established through the planning process where the same set of plan components apply to convey a certain management emphasis (such as the wildlife habitat management area). A management area may or may not be spatially contiguous across the national forest. A designated area is an area or feature established by statute (such as a wild and scenic river) or administrative processes (such as a research natural area) and is managed to maintain the area's unique special character or purpose.

The forest plan contains a specific coding system to identify plan components and where they apply using the following pattern: AAA-BBB-CCC. The series of letters before the first dash references a resource area (for example, WTR for watershed conditions), management area (MA), or designated area (DA). The second series of letters references whether the plan components apply forestwide (FW), to land of specific character (such as RFIR for the red fir vegetation type), or to a type of management or designated area (such as DRA for the destination recreation area). The third series of letters references the type of plan component (such as DC for desired conditions). So the unique coding for air resources (AIR) desired conditions (DC) that apply forestwide (FW) begins with AIR-FW-DC, followed by the specific plan component number; and the coding for wilderness (WILD) guidelines (GDL) that apply to all designated areas (DA) of this type begins with DA-WILD-GDL.

Every project and activity authorized after plan approval must be consistent with the six types of plan components found in this plan (36 CFR 219.15(d)). Where there is overlap among the different types of areas where plan components apply (for example, management area versus forestwide), apply all applicable plan components where compatible; otherwise, the more stringent or restrictive direction applies. Exceptions to plan components occur where there are concerns for human health and safety in emergency situations.

A plan amendment is required to add, modify, or remove any plan components, or to change how or where plan components apply, including management areas (36 CFR 219.13(a)).

Other Plan Content

In addition to plan components, the 2012 Planning Rule requires that a plan have other required content (36 CFR 219.7(f)(1)), including priority watersheds for maintenance or restoration, the plan area's distinctive roles and contributions within the broader landscape, a plan monitoring program, and proposed and possible actions that may occur in the plan area.

Priority watersheds are identified and described in the Watershed Condition section of chapter 2. Distinctive roles and contributions described above are intended to help provide focus or context to the plan, a foundation for developing plan components, and an all-lands perspective. The plan monitoring program is found in chapter 4 where it is explained in detail.

Proposed and possible actions are found in appendix B. This appendix lists the types of possible projects for the next 3 to 5 years to move toward desired conditions and objectives. This list does not commit the Sierra National Forest staff to perform or permit these actions, but are provided as possible actions that would likely be consistent with plan components, particularly desired conditions and objectives. Proposed and possible actions also include the planned timber sale program, timber harvesting levels, and proportion of probable methods of forest vegetation management practices expected to be used (note that timber and vegetation management information is found in appendix E rather than appendix B).

A plan may also include optional content (36 CFR 219.7(f)(2)). Optional content in this plan includes explanatory narrative and background information throughout the plan, a strategy for a renewed partnership focus for the Sierra National Forest (appendix C), management strategies for resolving recreation resource conflicts (appendix D), and potential management approaches.

Potential management approaches are used to describe the principal strategies and program priorities the responsible official intends to use to carry out projects and activities developed under the plan. Potential management approaches can convey a sense of priority and focus among objectives and the likely management emphasis. They should relate to desired conditions and may indicate the future course or direction of change, recognizing budget trends, program demands and accomplishments. Potential management approaches may discuss processes such as analysis, assessment, inventory, project planning, or monitoring. Since potential management approaches are not plan components, they are listed at the end of each relevant resource, management area, or designated area section of the forest plan but they are not identified by a coding system.

Changes to "other plan content," including both required and optional content, may be made through an administrative change to the plan (36 CFR 219.13(c)). A substantive change to the monitoring program made outside of a plan revision or amendment process may only be made after the public is notified of the intended change and consideration of public comment. All other administrative changes to other plan content may be made following public notice.

Chapter 2. Forestwide Desired Conditions and Management Direction

Introduction

This chapter contains direction that applies forestwide (across all lands of the Sierra National Forest), unless more stringent or restrictive direction is found following forestwide direction. Forestwide direction includes desired conditions, objectives, goals, suitability of lands, standards, and guidelines. Other Forest Service direction, laws, regulations, policies, executive orders, and Forest Service directives (manual and handbook) are generally not contained in the forest plan components. Potential management approaches are also listed as appropriate in this chapter, but since potential management approaches are not plan components, they are not identified by a coding system.

This chapter is organized by resource, under two broad major categories:

- Ecological Sustainability and Diversity of Plant and Animal Communities
- Social and Economic Sustainability and Multiple Uses

The Sierra National Forest staff intends to move resources and uses toward these forestwide desired conditions over the next 10 to 15 years, although they may not all be achieved for many decades. Some desired conditions may be very difficult to achieve, but it is important to strive to achieve them over time.

Ecological Sustainability and Diversity of Plant and Animal Communities

The following topics are grouped under this heading:

- Air Quality
- Watershed
- Terrestrial Ecosystems and Vegetation
- Animal and Plant Species
- Invasive Species
- Fire

Air

Desired conditions and other plan components for air quality apply forestwide or to Class I airsheds, which have the highest standard of air quality. Class I airshed status applies to designated wilderness areas which were larger than 5,000 acres and in existence in 1977. The Ansel Adams, John Muir, and Kaiser Wildernesses are Class I airsheds on the Sierra National Forest.

Desired Conditions (AIR-FW-DC)

- 01 The air quality value of visibility in Class I airsheds is maintained or improved to the natural background condition specified in the California Regional Haze State Implementation Plan.
- 02 Wildland fuel loadings resemble natural range of variation conditions and the potential for harmful effects on air quality from high-intensity wildfires is low.

Goals (AIR-FW-GOAL)

- 01 Continue the visibility monitoring program and determine sensitive indicators for each air-quality-related value in Class I areas of the national forests. Protect air-quality-related values by reviewing all projects and management activities that may affect those values. Review external prevention of significant deterioration source applications and make recommendations to permitting authorities.
- 02 Participate in and support interagency collaborative smoke management, including real time smoke monitoring and public messaging to maximize efficiency and relevance of monitoring results.
- 03 Provide early notification to the public about potential smoke from fire activities to promote awareness and protect human health and safety.
- 04 Support post-fire analysis of smoke impacts as they relate to emissions when they can inform refinement of smoke dispersion and transport modeling. Include analytical tradeoff and impact information, as appropriate, in public messaging to show smoke tradeoffs from large landscape scale fuels treatment projects.
- 05 Work with State agencies and the public in State-level planning efforts that address air quality concerns.
- 06 Coordinate management activities that potentially impact the air quality of adjacent Class I areas with the responsible agency.

Guidelines (AIR-FW-GDL)

- 01 Project design for prescribed burns, and strategies for wildfires, should incorporate emission reduction techniques to reduce negative impacts to air quality, subject to economic constraints, technical feasibility, safety criteria and land management objectives.
- 02 Decision documents for wildfires and prescribed burns should identify smoke sensitive areas and include management objectives and courses of action to mitigate impacts to those areas.

Potential Management Approaches

- Include smoke tradeoff evaluation in project-level planning comparing local (such as prescribed fire) and regional (such as wildfire) scales. Use existing scientific information on large wildfire emissions. Consider downwind communities at the local and regional scale.

Watershed Conditions

Plan components found in this section of the plan cover the broad area of soils and water throughout the Sierra National Forest at the watershed scale. Watersheds include riparian conservation areas (RCA) and the riparian and aquatic environments contained within them, such as rivers, streams, meadows, springs, and seeps. Plan components specific to these areas are also found here. Figure 2 shows the relationship among watersheds, riparian conservation areas, and riparian and aquatic environments.

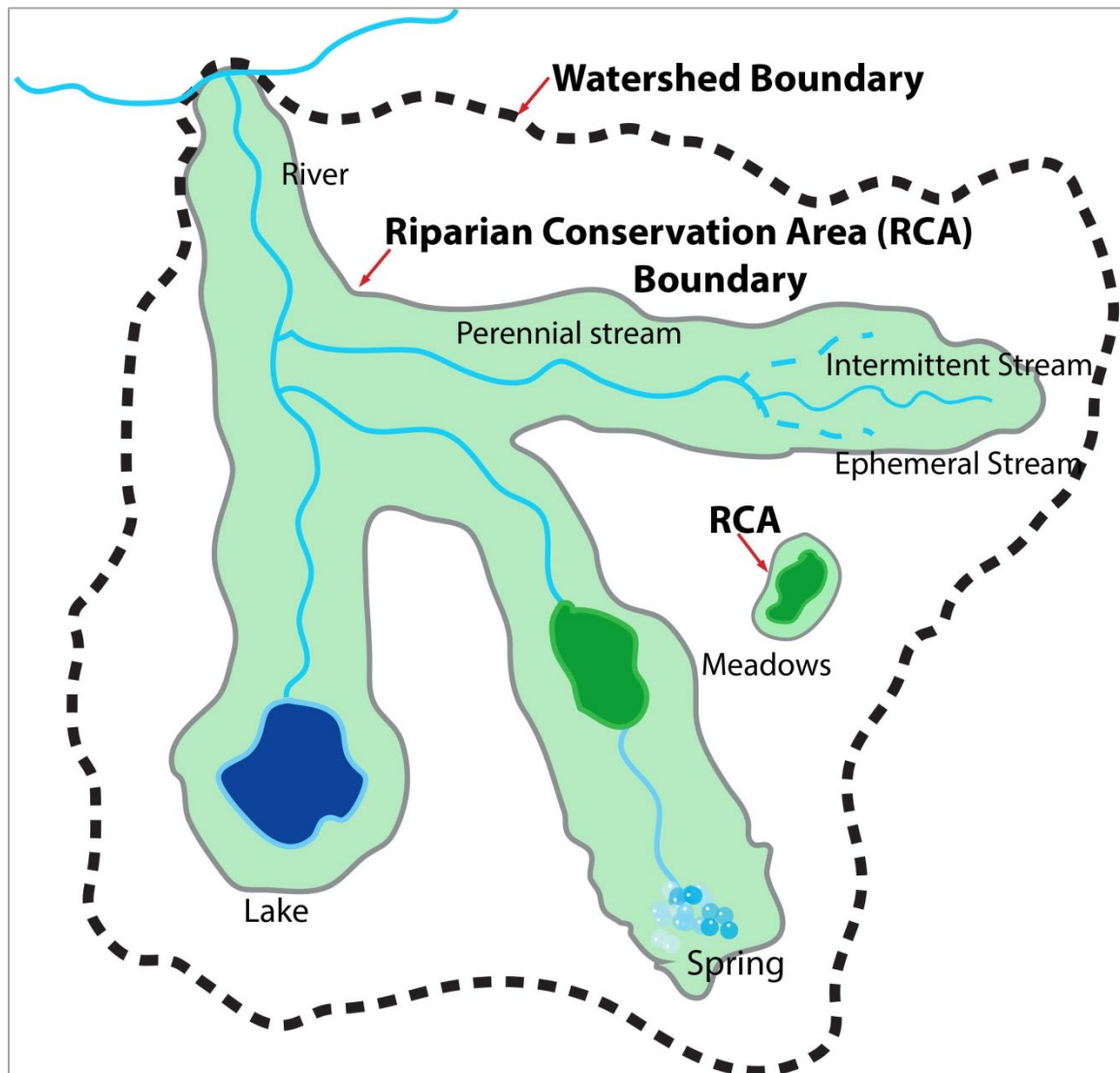


Figure 2. A schematic of the relationship of watersheds, riparian conservation areas, and riparian and aquatic environments

Conservation watersheds are a specific subset of watersheds selected by national forest managers to provide for continued high-quality water sources and the long-term persistence of at-risk species. The “Management Areas” section in chapter 3 presents plan components specific to conservation watersheds.

The plan components found in this section and in the “Conservation Watersheds” section in chapter 3, along with the monitoring indicators in chapter 4, form the foundation of the aquatic and riparian conservation strategy (see appendix F). These plan components and monitoring indicators have been integrated to provide for the maintenance and restoration of aquatic ecological integrity across the Sierra National Forest.

The Forest Service’s national Watershed Condition Framework is used to identify priority watersheds for restoration. Priority watersheds are where plan objectives for restoration would concentrate on maintaining or improving watershed condition. Under the framework, the Sierra National Forest Supervisor is responsible for identifying priority watersheds using an interdisciplinary team process.

The list of priority watersheds can be changed administratively without a forest plan amendment. Watershed Condition Framework priority watersheds are mapped online at the USDA Forest Service Watershed Condition and Prioritization Interactive map (http://www.fs.fed.us/biology/watershed/condition_framework.html).

Forestwide Components for Watershed Conditions

Desired Conditions (WTR-FW-DC)

- 01 Adequate quantity and timing of water flows support ecological structure and functions, including aquatic species diversity and riparian vegetation. Watersheds are resilient to changes in air temperatures, snowpack, timing of runoff, and other effects of climate change.
- 02 Water quality supports State-designated beneficial uses of water. Water quality is sustained at a level that retains the biological, physical, and chemical integrity of aquatic systems and benefits the survival, growth, reproduction, and migration of native aquatic and riparian species.
- 03 Watersheds are fully functioning or trending toward fully functioning and resilient; recover from natural and human disturbances at a rate appropriate with the capability of the site; and have a high degree of hydrologic connectivity laterally across the floodplain and valley bottom and vertically between surface and subsurface flows. Physical (geomorphic, hydrologic) connectivity and associated surface processes (such as runoff, flooding, instream flow regime, erosion, and sedimentation) are maintained and restored. Watersheds provide important ecosystem services such as high-quality water, recharge of streams and shallow groundwater, and maintenance of riparian communities. Watersheds sustain long-term soil productivity.
- 04 Soil and vegetation functions in upland and riparian areas are sustained and resilient. Healthy soils provide the base for resilient landscapes and nutritive forage for browsing and grazing animals, and support timber production. Healthy upland and riparian areas support healthy fish and wildlife populations, enhance recreation opportunities, and maintain water quality.

Objective (WTR-FW-OBJ)

- 01 At least two priority watersheds will experience improvements allowing them to shift to a higher functioning condition class, as defined by the national Watershed Condition Framework, within 15 years of plan approval.

Goals (WTR-FW-GOAL)

- 01 Coordinate with Tribes; local, State, and Federal agencies; adjacent landowners; and other interested parties on watershed restoration across ownership boundaries.
- 02 Take a landscape- or watershed-scale approach to restoring aquatic and riparian ecosystems, integrating with recreation, range management, fuels, and vegetation management to efficiently use limited resources, including partnerships, and to effectively address climate change.

Standards (WTR-FW-STD)

- 01 Use best management practices as described in agency technical guides and handbooks to mitigate adverse impacts to soil and water resources during the planning and implementation of national forest management activities.
- 02 Restoration projects will not result in long-term degradation of aquatic and riparian conditions, including connectivity, at the watershed or subwatershed scale. Adverse effects from project activities are acceptable when they are short-term, site-scale, and support, or do not diminish, long-term recovery of aquatic and riparian resources.
- 03 For exempt hydroelectric facilities on National Forest System lands, ensure that special use permit language provides adequate instream flow requirements to maintain, restore, or recover favorable ecological conditions for local riparian- and aquatic-dependent species.
- 04 After restoration actions (including soil disturbance or seeding activities), limit subsequent soil-disturbing management activities until project objectives have been met.

Guidelines (WTR-FW-GDL)

- 01 Cooperate with Federal, tribal, State and local governments to secure in-stream flows needed to maintain, recover, and restore riparian resources, channel conditions, and aquatic habitat during all basic Federal Energy Regulatory Commission, state and other authorized water use planning, water rights, and relicensing on the national forest. Coordinate relicensing projects with the appropriate State and Federal agencies. Provide written and timely license conditions to the Federal Energy Regulatory Commission.

Potential Management Approaches

- Look for opportunities to restore watersheds that are in need of thinning, fuels reduction, meadow restoration, soil condition improvement, water quality improvement and restoration of hydrologic and ecological connectivity.
- Maintain and restore soils with favorable infiltration characteristics and diverse vegetative cover to absorb and filter precipitation and to sustain favorable conditions of stream flows.
- Educate recreation users to properly dispose of waste and potential pollutants.

Riparian Conservation Areas

Riparian conservation area widths are defined by type:

- perennial streams, 300 feet on each side of the stream, measured from the bank full edge of the stream;

- seasonally flowing streams (includes intermittent and ephemeral streams), 150 feet on each side of the stream, measured from the bank full edge of the stream;
- streams in inner gorge (defined by stream adjacent slopes greater than 70 percent gradient), top of inner gorge;
- special aquatic features (such as lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs) or perennial streams with riparian conditions extending more than 150 feet from edge of streambank, or seasonally flowing streams with riparian conditions extending more than 50 feet from edge of streambank, 300 feet from edge of feature or riparian vegetation, whichever width is greater; and
- other hydrological or topographic depressions without a defined channel, riparian conservation area width and protection measures determined through project-level analysis.

Riparian conservation area widths may be adjusted at the project level if interdisciplinary analysis demonstrates a need for different widths to meet or improve desired conditions for riparian conservation areas. Locations of riparian conservation areas for the Sierra National Forest are shown in figure 11 (appendix A).

Riparian conservation area plan components apply to the entire riparian conservation area, as well as the specific riparian and aquatic environments contained within them, such as rivers, streams, meadows, springs and seeps. Riparian and aquatic environments also have additional direction specific to each environment. The relationship among watersheds, riparian conservation areas, and riparian and aquatic environments is displayed in figure 2, chapter 2.

All Riparian Conservation Areas

Desired Conditions (WTR-RCA-DC)

- 01 The connections of floodplains, channels, and water tables distribute flood flows and sustain diverse habitats.
- 02 Riparian conservation areas have ecological conditions that contribute to the recovery of threatened and endangered species and support persistence of species of conservation concern as well as native and nonnative aquatic and riparian-dependent plant and animal species
- 03 The distribution and health of biotic communities in special aquatic habitats perpetuates their unique functions and biological diversity.
- 04 Native fish, amphibians, and other native aquatic species are present within their historic distribution, adjusted for climate change. Habitat conditions support self-sustaining populations, except where distributions are altered by areas managed for desirable nonnative fish species. Streams and rivers provide a variety of habitats for aquatic species, including deep pools and overhanging banks, structure provided by large wood, off-channel areas, and cover within their natural range of variation. Woody and herbaceous overstory and understory regulate stream temperatures. Aquatic and upland components are linked, providing access to food, water, cover, nesting areas, and protected pathways for aquatic, riparian, and upland species.
- 05 Riparian areas provide a range of substrates to sustain habitat for a variety of aquatic and terrestrial fauna within their natural capacity of the system.

- 06 Soil structure and function is sustained to infiltrate and disperse water properly, withstand erosive forces, sustain favorable conditions of stream flow, and cycle nutrients. Associated water tables support riparian vegetation and restrict nonriparian vegetation.
- 07 Key riparian processes and conditions (including slope stability and associated vegetation root strength, wood delivery to streams and floodplains, input of leaf and organic matter to aquatic and terrestrial systems, solar shading, microclimate, and water quality) operate consistently with local disturbance regimes.
- 08 The condition of riparian vegetation, including riparian species composition, stand density, and fuel loading, is consistent with healthy riparian systems and reduces risks from high-intensity wildfire in the watershed.
- 09 Riparian areas in frequent fire landscapes (such as montane areas) have low- to moderate-severity fire restored as an ecological process. Fire effects occur in a mosaic and supports restoration of ecological integrity, including ecosystem function, composition, structure, and resilience.
- 10 New introductions of invasive species are prevented. Where invasive species are adversely affecting the persistence of native species, we work with the appropriate State and Federal agencies to reduce impacts of invasive species to native populations.
- 11 Along all State-designated Wild and Heritage Trout waters, streamside vegetation provides stream shading and fish cover, based on capability of the site.
- 12 Spatial and temporal connectivity for riparian- and aquatic-dependent species is maintained within and between watersheds. Connectivity provides physically, chemically and biologically unobstructed movement for species survival, migration, and reproduction.
- 13 Native riparian vegetation is diverse, structurally complex, and provides food and cover to sustain fish and wildlife populations.

Objective (WTR-RCA-OBJ)

- 01 Restore the structure and composition of at least 400 acres in riparian areas within 15 years following plan approval, emphasizing riparian areas that face the most risk from large-scale high-intensity fire, past fire exclusion, or accelerated flooding events associated with climate change.

Goals (WTR-RCA-GOAL)

- 01 Coordinate and collaborate with State fish and wildlife agencies to address native aquatic species issues, including evaluating management and monitoring needs to address aquatic species requirements
- 02 Where aquatic invasive species are adversely affecting the persistence of aquatic native species, work with the appropriate State and Federal wildlife agencies to reduce impacts of aquatic invasive species to native populations.

Suitability (WTR-RCA-SUIT)

- 01 Riparian conservation areas (perennial, intermittent, and ephemeral streams and special aquatic features) are not suitable for timber production. Timber harvest is allowed for other multiple-use purposes including safety and restoration towards desired conditions.

Standards (WTR-RCA-STD)

- 01 Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages.
- 02 Limit pesticide applications to cases where project-level analysis indicates pesticide applications are consistent with riparian conservation area desired conditions.
- 03 Prohibit storage of fuels and other toxic materials except at designated administrative sites and sites covered by special use authorization. Prohibit refueling within riparian conservation areas except when there are no other reasonable alternatives.
- 04 Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species, except where desired to protect native species.
- 05 All new or replaced permanent stream crossings shall accommodate at least the 100-year flood, its bedload, and debris. Estimates for 100-year flood potential will reflect the best available science regarding potential effects of climate change, and species needs.
- 06 Locate water drafting sites to minimize adverse effects to instream flows and depletion of pool habitat.
- 07 Prevent disturbance to streambanks and shorelines of lakes and ponds caused by resource activities (such as livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of the stream reach, or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard may not be met within destination recreation management areas, and sites authorized under special use permits, but activities will be designed and managed to reduce the percent of impact to the extent feasible.
- 08 In fen ecosystems, limit disturbance from livestock and packstock to no more than 20 percent annually. Reduce disturbance further if a fen is nonfunctional or functional at risk with a downward trend.
- 09 Use screening devices for water drafting pumps. (Fire suppression activities are exempt during initial attack.) Use pumps with low entry velocity to minimize removal of aquatic species from aquatic habitats, including juvenile fish, amphibian egg masses, and tadpoles.
- 10 Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining fen ecosystems and the plant species that depend on these ecosystems.
- 11 Prevent activities from causing significant degradation of fens from trampling, such as by livestock, packstock, wheeled vehicles, and people.
- 12 Assess the hydrologic function of riparian areas, meadows, fens, and other special aquatic features during rangeland management analysis. Ensure that characteristics of special features are, at a minimum, at proper functioning condition or functioning at risk and trending toward proper functioning condition, as defined in appropriate technical report. If systems are functioning at risk, assess appropriate actions to move them towards proper functioning condition.

- 13 Complete initial inventories of fens within active grazing allotments prior to completing the allotment environmental analysis. If there are more than 10 fens in an allotment, complete initial inventories of at least 25 percent of all the fens in the allotment, and establish a 5-year schedule to complete inventory of the remaining fens in the allotment.
- 14 Limit construction of new skid trails or temporary roads for access into riparian conservation areas unless it is the only feasible option to conduct restoration activities for improvement of riparian conservation areas. When conducting restoration activities for protection or improvement of riparian conservation areas, best management practices for erosion must be followed to prevent soil loss.
- 15 Designate equipment exclusion zones within riparian conservation areas when designing projects. The exclusion zone width is within 150 feet of perennial streams, meadows springs, and seeps; and 75 feet for intermittent streams. These widths will increase as slope increases, or if soils are unstable. Adjustments will be made only after consultation with experts in soils, hydrology, fisheries, and/or aquatic ecology. Any project, occurring within the exclusions zone will repair any damage, including stabilizing soils.

Guidelines (WTR-RCA-GDL)

- 01 See also MA-CW-STD-01. Hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features should be maintained and restored. Roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths should have corrective actions implemented where possible to restore connectivity.
- 02 Water quality or habitat for aquatic and riparian-dependent species should be maintained or restored. Roads, trails, off-highway vehicle trails, staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day use sites that have been identified as contributing to degradation of water quality or habitat for aquatic and riparian-dependent species should have corrective actions implemented where possible.
- 03 When vegetation is treated in near-river or stream areas, coarse wood should be considered as an addition to the streams to enhance habitat, where possible.
- 04 To reduce soil disturbance in riparian conservation areas, activities should use methods that limit soil disturbance to less than 20 percent (such as low ground pressure equipment, helicopters, over-snow logging, extra ground cover requirements, or other non-ground disturbing actions) to achieve desired conditions consistent with best management practices and plan direction.
- 05 Post-wildfire management activities should emphasize and enhance native vegetation cover, stabilize channels, reduce erosion, and minimize adverse effects from the existing road network to protect the riparian systems.
- 06 To improve water quality or habitat for aquatic and riparian-dependent species, evaluate the impacts of facilities on riparian conservation areas when reissuing permits for livestock. If impacts are found, existing livestock facilities should be located outside of meadows and riparian areas.
- 07 Wildfire control methods and activities that would impact the riparian conservation area (in particular dozer-built lines) should not be used unless alternative control methods are

- not safe or practical. If dozers are used, the lines should be repaired during suppression repair.
- 08 Stream reaches of all State-designated wild trout waters (designated as of October 2017) should be managed according to the following: Any activity that results in trampling and chiseling should not exceed 20 percent of any given stream reach to reduce sedimentation into wild trout waters. A reach is defined as a continuous portion of a stream with homogeneous physical characteristics.
 - 09 Mechanical exclusion zones of 25 feet on either side of an ephemeral stream with structure should be designated to protect soils and streams from sedimentation and subsequent erosion. The necessity of increasing buffers on these headwater streams with structure should be analyzed by specialists in soils, hydrology, aquatics, and/or fisheries where slope, aspect, recent fires, soil conditions, or species occupancy raise concerns.
 - 10 To protect water quality and species habitats, unstable streambanks should be restored to attain a streambank system that is no more than 10 percent unstable of the reach's current potential.
 - 11 To protect water quality and spawning habitat, stream-modifying construction activities within or immediately adjacent to the aquatic zone should be limited to when stream flows are the lowest.

Potential Management Approaches

- Ensure that fuel spill and erosion control plans are reviewed, up to date, and determined sufficient to protect soils and aquatic resources.
- Recommend restoration practices in: (1) areas with compaction in excess of soil quality standards; (2) areas that have lowered water tables; or (3) areas that are actively down cutting or that have historic gullies. Include restoration of aspen or other riparian vegetation where conifer encroachment is identified as a problem, using fire, hand or mechanical treatments. Identify management practices such as road building, recreational use, grazing, and timber harvest that may be contributing to the observed degradation.
- When existing routes through riparian areas and meadows are not compatible with riparian dependent resources, consider re-routing.
- Rerouting trails, relocating dispersed campsites, and fencing of areas will be considered to manage activities and improve riparian conditions in identified areas not meeting desired conditions.

Meadows

Desired Conditions (WTR-RCA-MEAD-DC)

- 01 Meadows are hydrologically functional. Sites of accelerated erosion, such as gullies and head cuts are stabilized, recovering, or within the natural range of variation. Vegetation roots occur throughout the available soil profile. Meadows with perennial and intermittent streams have the following characteristics: (1) stream energy from high flows is dissipated, reducing erosion and improving water quality; (2) streams filter sediment and capture bedload, aiding floodplain development; (3) meadow conditions enhance floodwater retention and groundwater recharge; and (4) root masses stabilize streambanks against cutting action.

- 02 Wetlands and groundwater-dependent ecosystems (including springs, seeps, fens, wet meadows, and associated wetlands or riparian systems) support stable herbaceous and woody vegetation communities that are resilient to drought, climate change, and other stressors. Root masses stabilize stream channels, shorelines, and soil surfaces. The natural hydrologic, hydraulic, and geomorphic processes in these ecosystems sustain their unique functions and biological diversity.
- 03 Meadows are resilient and recover rapidly from natural and human disturbances. They exhibit a high degree of hydrologic connectivity laterally across the floodplain and vertically between surface and subsurface flows. They provide important ecosystem services such as high-quality water, recharge of streams and aquifers, and moderation of climate variability and change.
- 04 Soils in wet and headwater meadows are influenced by a shallow water table and function to filter water. These soils also store and release water over an extended period of time, which helps to maintain streamflow during dry summer months.
- 05 Meadows have substantive ground cover and a rich and diverse species composition, especially of grasses and forbs. Meadows have high plant functional diversity with multiple successional functional types represented. Perennial streams in meadows contain a diversity of age classes of shrubs along the streambank, where the potential exists for these plants.
- 06 A complexity of meadow habitat types and successional patterns support native plant and animal communities. Meadow species composition is predominantly native, where graminoid (grass-like) species are well represented and vigorous, and regeneration occurs naturally. Healthy stands of willow, alder, and aspen are present within and adjacent to meadows with suitable physical conditions for these species. Natural disturbances and management activities are sufficient to maintain desired vegetation structure, species diversity, and nutrient cycling.
- 07 Meadows in montane and upper montane areas have low- to moderate-severity fire restored as an ecological process, especially on meadow edges, limiting conifer encroachment, and enhancing native understory plant composition and cover.
- 08 Fen condition is within the natural range of variation. Fens are resilient with continual peat accumulation and carbon sequestration. The hydrologic regime, and vegetation, soil, and water characteristics sustain the fen's ability to support unique physical and biological attributes.

Objective (WTR-RCA-MEAD-OBJ)

- 01 Enhance or improve conditions on at least five meadows of any size, within 15 years following plan approval.

Rivers and Streams

Desired Conditions (WTR-RCA-RIV-DC)

- 01 Stream ecosystems, riparian corridors, and associated stream courses sustain ecosystem structure; are resilient to natural disturbances (such as flooding) and climate change; promote the natural movement of water, sediment, and woody debris; and provide habitat for native aquatic species or desirable nonnative species.

- 02 Stream ecosystems, including ephemeral watercourses, exhibit full connectivity where feasible to maintain aquatic species diversity, except where barriers are maintained in good condition to protect native aquatic species. Ephemeral watercourses provide for dispersal, access to new habitats, perpetuation of genetic diversity, and nesting and foraging habitat for riparian and aquatic species.
- 03 Instream flows are sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and retain patterns of sediment, nutrients, and wood routing as close as possible to those with which aquatic and riparian biota evolved. The physical structure and condition of streambanks and shorelines minimize erosion and sustain desired habitat diversity.
- 04 Streams and rivers maintain seasonal water flow over time, including periodic flooding, which promotes natural movement of water, sediment, nutrients, and woody debris. Flooding creates a mix of stream substrates for fish habitat, including clean gravels for fish spawning, large wood structures, and sites for riparian vegetation to germinate and establish.
- 05 Stream channel conditions exhibit a sediment regime under which aquatic and riparian ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport. The sediment regime should be similar to the natural distribution of reference conditions.
- 06 Within rivers and streams, the level of coarse large woody debris is within the natural range of variation.

Objectives (WTR-RCA-RIV-OBJ)

- 01 Enhance or restore the structure, composition, or function of habitat for fisheries and other aquatic species along at least 5 stream miles over a 15-year period.
- 02 Eliminate or mitigate at least one priority barrier to aquatic organism passage or ecological connectivity within 15 years following plan approval.

Lakes, Pools, Ponds

Desired Conditions (WTR-RCA-LPP-DC)

- 01 Lakes and ponds retain necessary attributes, such as adequate vegetation and large woody debris to function properly and support native biotic communities. Attributes include floodwater retention and groundwater recharge, stabilized islands and shoreline features, and diverse characteristics to provide for amphibian production, waterfowl breeding, and biodiversity.

Springs and Seeps

Desired Conditions (WTR-RCA-SPR-DC)

- 01 Springs provide sufficient water to maintain healthy habitats for native riparian and aquatic species.
- 02 Springs are resilient to natural disturbances, groundwater diversions, and changing climate conditions. Springs function across the landscape within their type and water availability.

- 03 Springs and associated streams and wetlands have the necessary soil, water, and vegetation attributes to be healthy and functioning at or near potential. Water flow is similar to historic levels and persists over time, within constraints of climate change.

Terrestrial Ecosystems

Terrestrial (land-based) ecosystems are diverse across the Sierra National Forest, changing with elevation and topographic factors like slope and aspect as shown in figure 3.

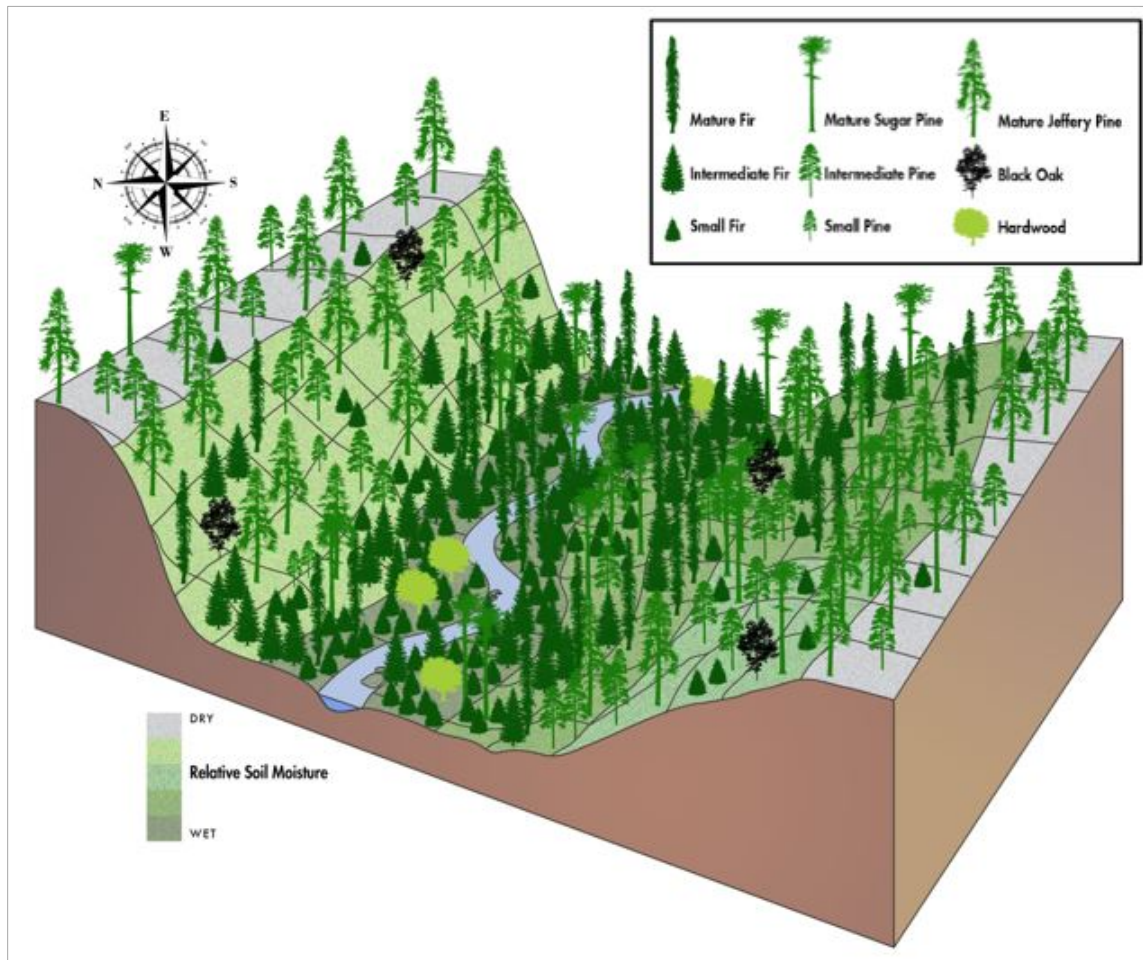


Figure 3. Variation in dominant trees and tree density²

This diagram illustrates how tree size and tree density vary across the topography of a watershed. The cross-section of a watershed is shown with a river or stream in the middle and slopes rising to a ridgetop on either side. Individual trees are shown with lighter colors depicting sun-dependent pine trees and darker green colors depicting shade-tolerant fir trees. The slope on the left is south facing and thus warmer and drier, with widely spaced pine trees and scattered fir trees. In the valley bottom, fir and hardwood trees dominate in a clumpy distribution. The north-facing slope

² North, M., P. A. Stine, K.L. O'Hara, W.J. Zielinski, and S.L. Stephens. 2009. An ecosystems management strategy for Sierra mixed-conifer forests, with addendum. General technical report PSW-GTR-220. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, California, USA.

is more shaded and thus often cooler and moister, with a moderate density of trees that become more widely spaced as they approach the warmer and drier ridgetop.

Terrestrial ecosystems are described in the following paragraphs in terms of ecological zones named the foothill zone, montane zone, upper montane zone, and the subalpine and alpine zones. The ecological zones were mapped broadly using elevation breaks, but vary on the ground in location with respect to aspect and other topographic or soil factors. Each zone has different dominant plants, seasonal weather, and wildlife habitat. Because of these distinctions, each of these ecological zones has desired conditions described for the dominant vegetation types or subtypes. For the more widespread forest types in the mixed conifer zone, there are separate desired conditions for the drier versus wetter parts of the landscape. The nature of each vegetation type may vary by location but the desired conditions are designed to be broad enough to allow individual, site-specific adjustments at the project level to adjust for these differences.

Foothill Zone – At the lowest elevations, rising above the valley floor is the foothill zone. The foothill zone is a mosaic of blue oak woodland savannahs and chaparral-live oak plant communities. At the upper reaches of the foothill zone, ponderosa pine and black oak forests intermingle with the blue oak and chaparral communities.

The foothill zone reaches up into the coniferous forest-dominated montane zone, which is dominated by ponderosa pine and mixed conifer forests on the western slopes of the Sierra Nevada. White fir, sugar pine, incense cedar and occasionally Douglas-fir are intermixed throughout the montane zone. Ponderosa pine is dominant at the lower elevations and drier portions of this zone; at the higher reaches of the zone Red fir is present. The dry mixed conifer type occurs on the south and west aspects, ridges and upper slopes and is distinguished by typical dry site understory indicator plants such as buckwheat and iris. These areas have been altered greatly by fire suppression and past management actions. Formerly dominated by fire and drought resilient ponderosa pine and black oak, there is now a heavy ingrowth of white fir.

Montane Zone – Moist mixed conifer forests are found in the montane zone where soil moisture is higher, such as lower slopes, drainages, north and east aspects or where water tables are close to the surface. Understory plants here include trailplant, false solomon's seal, starflower, fairy bells, hazel or Pacific dogwood. These areas have also been altered greatly by fire suppression and past management actions. Formerly co-dominated by ponderosa and sugar pine, it is now heavily dominated by white fir. Forests are more uniform, where formerly they were highly irregular and patchy.

Upper Montane Zone – Next the upper montane zone occurs at higher elevations and receives a high percentage of precipitation that falls as snow. This zone is primarily comprised of red fir forests, open Jeffrey pine woodlands, wet and dry lodgepole pine forests, meadows and riparian areas, and montane chaparral. These vegetation types occur in a patchy mosaic across the upper montane landscape, depending on changes in elevation, topography, soils, climate, and prior disturbance history. Fire is an especially important ecological process in the upper montane zone, influencing forest structure and composition patterns, such as intermingled patches of trees and open areas. As with lower montane forests, decades of fire exclusion, past timber harvest, and patterns of increasing high severity fire have resulted in increasing degrees of structural homogenization in upper montane forests at a landscape scale.

Subalpine and Alpine Zones – At the highest elevations, the sparsely vegetated subalpine and alpine zones occur. The subalpine zone has stands of mountain hemlock and open, windswept pines. Whitebark pine is found in harsh, windswept areas of the alpine zone. The alpine zone is

generally referred to as “above timberline” but may have stunted trees, often referred to as *krummholz*, especially of whitebark pine. It supports a rich understory flora of over 600 species, 200 of which are limited to that zone.

Desired conditions are described at different spatial scales, or extent of area. First, are landscape-scale desired conditions, applying to areas greater than 10,000 acres. The intent is to provide conditions that cover multiple small or medium sized vegetation management projects or single very large (greater than 100,000 acre) sized projects. The latter would be applied over multiple years, on a forestwide basis. Ecological zones are broad and not exact—for monitoring at forestwide and multi-forest scales. Second, are the mid-scale desired conditions, applying to areas in the hundreds to thousands of acres. These desired conditions are applicable to smaller areas, such as a large single patch of vegetation or mosaic of patches in an area or sub-watershed. Third, are the fine-scale desired conditions, applying to the variation on the ground of smaller vegetation elements, such as understory shrubs, gaps or small openings, and litter cover.

Patches are areas where there is similar dominant species and vegetation structure. They are similar to the term “forest stand” but encompass a broader range of ecological aspects. Patches may not be uniform but they are different from the surrounding areas. One may have a “salt and pepper” look from above of tree clumps and gaps and another may be a uniform sea of forest canopy. Some desired conditions include the term “within-patch”. This refers to changes at the fine-scale like, patches of shrubs or clumps of trees within patches.

Terrestrial ecosystem plan components do not apply to administrative or developed recreation sites.

Forestwide Components for Terrestrial Ecosystems

Desired Conditions (TERR-FW-DC)

- 01 Each vegetation type is represented by a mosaic of conditions, densities, and structures. This mosaic, which occurs at a variety of scales across landscapes and watersheds, reflects conditions that provide for ecosystem integrity and diversity.
- 02 Vegetation structure and composition provide ecosystem resilience to climate change and other stressors including altered fire regimes, drought, and flooding in riparian systems.
- 03 Terrestrial ecosystems retain their essential processes and functions.
- 04 Native insect and disease populations are generally limited with occasional outbreaks. Vegetation structural diversity and resilience minimizes the scale of insect and disease outbreaks.
- 05 Ecological conditions contribute to the recovery of threatened and endangered species, conserve proposed and candidate species, and support the persistence of species of conservation concern.
- 06 The landscape contains a mosaic of vegetation types and structures that provide habitat and connectivity for a variety of species including wide-ranging habitat generalists such as black bear and mule deer; more localized, semi-specialists such as ground-nesting and cavity-nesting birds and mammals; and habitat specialists such as old forest and early seral associated species.

- 07 The carbon carrying capacity for a given ecosystem is stable or improving, given trends in climate change, fire, insects, disease, and drought.
- 08 Fire occurs as a key ecological process in fire-adapted ecosystems where it does not pose an unacceptable risk to life and property. Fire regimes, including the frequency, extent, and severity of fire, is ecologically appropriate and enhances ecosystem resilience and habitat heterogeneity, diversity, and quality.
- 09 Composition, density, structure, and condition of vegetation help reduce the threat of undesirable wildfires to local communities, ecosystems, and scenic character.
- 10 Terrestrial ecosystems provide a variety of benefits that improve people's economic, social, and physical wellbeing (clean water, forest products, livestock forage, carbon sequestration and storage, energy generation, recreational opportunities, landscapes with scenic character and scenic integrity, cultural uses, and biodiversity).
- 11 Vegetation provides sustainable amounts of forest products (including wood fiber; biomass; forage; firewood; edible and medicinal plants; and boughs, bark, berries and cones) for commercial, Tribal, personal, educational, and scientific uses. These products are provided while sustaining soil and water quality and productivity.
- 12 Vegetation types and vegetation conditions support continued use by Tribes for traditional, ceremonial and medicinal purposes.

Objectives (TERR-FW-OBJ)

- 01 Restore forest structure and composition on 30,000 to 60,000 acres of the montane, upper montane, and portions of the foothill landscapes, using primarily mechanical treatment, within 15 years following plan approval.
- 02 Restore low and moderate severity fire mosaics on at least 50,000 acres within 15 years following plan approval.
- 03 Implement restoration, enhancements, fuels reduction, or maintenance actions in at least 5 areas of Tribal importance within 15 years following plan approval.

Goals (TERR-FW-GOAL)

- 01 Work cooperatively with researchers and other organizations to develop appropriate ecological restoration measures, especially within forest landscapes impacted by drought, bark beetle outbreaks, or uncharacteristic wildfire.
- 02 Restoration projects following large stand-replacing events (such as wildfire, drought, and bark beetle outbreaks) in forest landscapes should be designed to consider:
 - a. safety to people;
 - b. the development of restoration strategies that move current landscape conditions towards ecosystem desired conditions;
 - c. fuel loads and the need to restore natural fire regimes to the recovering landscape;
 - d. wildlife habitat, including the restoration of habitat for forest-dependent species;
 - e. opportunities to increase carbon storage and sequestration;

- f. future projections in climate and their influence on ecosystems in the affected area;
 - g. long-term maintenance of regional biodiversity; and
 - h. opportunities to recover some economic value as a harvested wood product from dead and dying trees.
- 03 Work cooperatively with Federal and State agencies and other partners to restore low to moderate severity fire to the landscape.

Standards (TERR-FW-STD)

- 01 Retain conifer trees greater than 30 inches in diameter except when public or firefighter safety is threatened or one of the conditions below is met:
- a. When required for equipment operability, individual trees less than 35 inches in diameter may be removed.
 - b. Outside of occupied California spotted owl territories, trees greater than 30 inches but less than 40 inches in diameter may be removed, felled for coarse woody debris, or girdled for snag creation under the following circumstances:
 - When removing trees is needed for aspen, oak, or meadow restoration treatments or for cultural or Tribal importance;
 - In overly dense stands to favor retention or promote the growth of even larger or older shade-intolerant trees to more effectively meet tree species composition and forest structure restoration goals; or
 - To promote the establishment, growth, and development of shade-intolerant species by creating small gaps (generally less than 0.5 acre) in stands historically dominated by shade-intolerant species.

Guidelines (TERR-FW-GDL)

- 01 Projects facilitate increasing heterogeneity at all scales, from tree clumps to large landscapes. Several treatment strategies can be employed: using landscape topography (slope, aspect, and slope position) to vary stand densities; promoting tree clumps and gaps within a stand, increasing the proportion of large to small trees; retaining important habitat structures such as large trees, snags, and trees with broken tops; and increasing diversity by promoting hardwoods, pines and native plant species.
Exceptions: Does not apply in community buffers.
- 02 Mechanical vegetation treatments within forested habitats should include a widely distributed but often clumped distribution of snags and downed logs. Along forest edges and within groups and clumps of large trees, snags and downed logs should be retained to provide habitat and roost sites for wildlife species such as small mammals, cavity-nesting birds, and tree-dwelling bats.
Exceptions: Does not apply in community buffers.
- 03 Management activities that generate accumulations of green slash should minimize potential impacts from bark beetles.

- 04 Mechanical vegetation treatments and salvage operations should retain all large hardwoods, greater than 12 inches in diameter (8 inches for blue oak), except where they pose a threat to human life or property or as needed for operability.
Exceptions: Does not apply in community buffers. Does not apply to community wildfire protection zone where there is no overlap with the wildlife habitat management area.
- 05 Burn prescriptions should be designed and implemented to minimize loss of large hardwoods greater than 12 inches in diameter (8 inches for blue oak). Specifically minimize losses on black oaks greater than 20 inches in diameter.
- 06 Design vegetation treatments to maintain or enhance special habitat features.

Potential Management Approaches

- Develop and implement a new business model replacing dependence on appropriated funding with a business model that acknowledges and utilizes stakeholder involvement and investment to increase national forest managers' ability to move vegetation toward desired conditions.
- Include the location of special habitats in the corporate geographic information system.
- Consider partnerships with Federal and State agencies and other partners to identify priority areas for restoration, including areas of high tree mortality or adjacent to communities threatened by uncharacteristic wildfires.
- To support old forest components, encourage the development of old forest conditions in areas where old forest is lacking and protect existing old forest components from stressors by prioritizing restoration in key old forest areas
- Promote native vegetation (such as conifers, hardwoods, and shrubs) in complex early-seral habitat that supports long-term ecosystem integrity considering climate change, drought, insects, disease and fire.
- Work with Tribes to determine priority areas for weed prevention and control, especially focused on traditional gathering areas that are threatened by weed infestations. Consult with Tribes before using pesticides or herbicides that may affect traditional gathering.
- Removal of infected trees may be necessary to prevent the spread of invasive species.

Blue-Oak Interior Live Oak Woodland

Desired Conditions (TERR-BLU-DC)

- 01 Blue oak-interior live oak woodlands occur in a highly variable and complex landscape pattern. Blue oak dominates the overstory in patches but is co-dominant with interior live oak or foothill pine. Blue oak woodlands are a mosaic of varying age and size classes with mature oaks that provide acorns from older trees. There are occasional pulses of blue oak regeneration to successfully replace mortality in older trees.
- 02 Fires occur periodically to maintain lower levels of dead grass and litter levels so that they do not fuel intense fire. Fires typically burn with low to moderate vegetation burn severity.

- 03 In annual grasslands, native plant abundance is maintained or improved and provides enough residual plant matter at the end of the growing season to maintain germination potential, site productivity and to protect soils.

Chaparral-Live Oak

Desired Conditions (TERR-CHAP-DC)

- 01 Chaparral comprises native shrub and understory species that reflect the natural range of variation for the site. The chaparral vegetation type is composed of varying age classes and densities that protect against accelerated erosion, with 2 to 20 percent of the type in early seral grass and herbaceous cover, 5 to 20 percent in native herbaceous plants and shrubs, and 70 to 95 percent in dense shrubs.
- 02 Chaparral is in a constant state of transition from young to older stages and back again, with fire as the primary disturbance. High severity fires that kill most aboveground stems occur on average every 35 to 100 years. Fire-return intervals allow the buildup of native shrub and plant seeds in the soil seed bank and for the accumulation of fuels necessary to support fire-induced regeneration. Invasive nonnative plants do not dominate between fires.

Guidelines (TERR-CHAP-GDL)

- 01 Treatments using fire within chaparral should be designed to provide a diversity of seral stages at the landscape scale. Where feasible, leave small to medium unburned or lightly burned patches for wildlife within very large burn units.
- 02 When chaparral is the potential natural vegetation type, treatment projects should not include active reforestation with the intent to convert the area to a forested type.

All Montane Vegetation Types

Desired Conditions (TERR-MONT-DC)

- 01 At the landscape scale, the Sierra Nevada montane landscape is a heterogeneous mosaic of open and closed canopy forest patches, meadows and riparian areas. These ecosystem types occur in a complex mosaic of different densities, sizes, and species mixed across large landscapes that vary with topography, soils, and snow accumulation. The composition, structure, and function of vegetation make these ecosystems resilient to fire, drought, insects, pathogens, and climate change. The mix of seral stage patches, and open versus closed canopied areas, varies by forest type as shown in table 1 and figure 4. Large and old trees are common in later seral stages throughout the landscape and in varying densities (see “Old Forest Habitats” section).
- 02 At the landscape scale, fire is a key ecological process restoring and maintaining patchy fuel loads, and increasing heterogeneity and understory plant vigor. Fires occur regularly, generally every 10 to 20 years. Fires in this zone burn with low, moderate, or mixed severity, with dispersed patches of high severity (greater than 75 percent basal area mortality) generally less than 10 acres and rarely greater than 200 to 250 acres in size. The proportion of areas burned at high severity within a fire is generally less than 10 to 15 percent.
- 03 At the landscape scale, white pines (such as sugar pine and western white pine) are healthy and vigorous with a low incidence of white pine blister rust. Individual trees and

the stands they occur in are resilient to moisture stress, drought, and bark beetles. White pine blister rust-resistant trees are regenerating, and populations are sustained.

Table 1. Percent of seral stage patches (larger than 10 acres) by vegetation type at the landscape scale (tens of thousands of acres)

Vegetation Type/Zone	Early Seral ¹	Small Tree ²	Open Mature Forest ³	Intermediate Mature Forest ⁴	Dense Mature Forest ⁵
Black Oak/ Ponderosa pine	5–20%	1–10%	20–40%	40–60%	0–20%
Ponderosa Pine	5–20%	1–10%	60–90%	10–20%	0–10%
Dry Mixed Conifer	10–20%	1–10%	60–90%	20–40%	0–20%
Moist Mixed Conifer	10–20%	2–15%	10–40%	30–60%	30–60%

1. Shrub, grass/herb, tree seedlings and saplings.
2. California wildlife habitat relationship system (CWHR)³ tree size classes 2 & 3.
3. CWHR 4 & 5; 10 to 40% tree cover.
4. CWHR 4 & 5; 40 to 60% tree cover.
5. CWHR 4, 5, & 6, more than 60% tree cover.

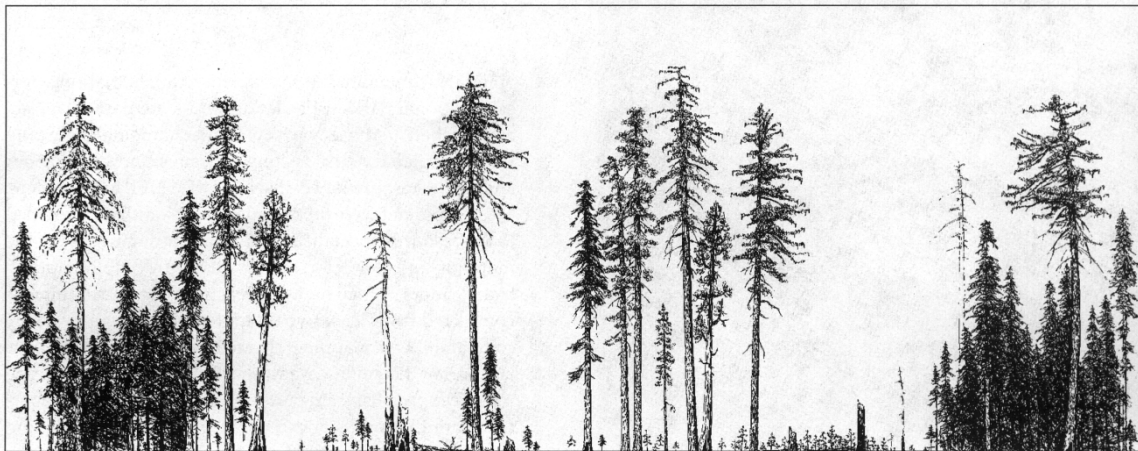


Figure 4. A diagram of a cross-section in a forest patch that illustrates the heterogeneity or complex mosaic of different forest densities, sizes, and species mix.⁴ From left to right there are large and likely old, overstory trees above a widely varying and clumpy understory. On the left, three large trees tower above a dense clump of mid and small fir trees. In the middle, encompassing two-thirds of the cross-section, several individual large trees and small clumps tower above a sparse understory, with scattered seedlings and clumps of shrubs. To the right, a similar dense patch as the one on the far left occurs, with a large snag and some mid-sized trees.

Black Oak/Canyon Live Oak

Desired Conditions (TERR-BLCK-DC)

- 01 Oak trees, snags, and down logs provide habitat for a variety of wildlife species. Oak snags and live trees with dead limbs, hollow boles, and cavities provide shelter, and

³ Mayer, K.E. and W.F. Laudenslayer. 1988. A Guide to Wildlife Habitats of California. California Department of Fish and Game. Available at: https://www.dfg.ca.gov/biogeodata/cwhr/wildlife_habitats.asp#guide_pub

⁴ As described by North and others (2009) in the General Technical Report 220, published by the U.S. Forest Service Pacific Southwest Research Station.

resting and nesting habitat. Acorns are plentiful, provide food for wildlife, and are available for traditional cultural uses.

Guideline (TERR-BLCK-GDL)

- 01 Where possible and appropriate to enhance forest structural heterogeneity or an underrepresented hardwood component, projects should create crown space around existing medium- to large-diameter California black oak and canyon live oak to allow crown development of the oaks. Where replacement age classes are missing, projects should create openings near mature oaks to stimulate natural regeneration or retain existing oak regeneration consistent with forest type desired conditions.

Ponderosa Pine

Desired Conditions (TERR-POND-DC)

- 01 At the landscape scale, the ponderosa pine vegetation type consists of open forests with a mosaic of varied tree sizes, densities and understory vegetation (figure 5). They are dominated by ponderosa pine trees and, where black oak is common, co-dominated by black oak. Understory shrubs and plants are common. These areas are highly resilient.
- 02 At the landscape scale, areas dominated by open-canopied forests of medium and large diameter trees comprise more than 60 percent of the landscape (table 1). Overstory tree canopy cover is variable, generally ranging from 10 to 50 percent at a fine-scale, with some small patches exceeding 50 percent cover. When black oak dominates the overstory, because of their wide crowns, canopy cover can be greater than 50 percent. Trees are denser in some locations such as north-facing slopes and canyon bottoms, but in small patches (less than 10 percent of the landscape). Large and old trees are common in most of the landscape in varying densities (see old forest section below). Trees greater than 30 to 40 inches in diameter are common in areas, especially pine and black oak.
- 03 At the mid- to fine scale, vegetation within patches is highly variable (table 2 and figure 5). Trees of different sizes and ages are variably spaced and comprise an irregular, uneven-aged forest. Individual trees are variably spaced with some denser groups. Groups mostly vary from 2 to 10 trees. Tree stocking (basal area) is highly variable, ranging from 20 to 200 square feet per acre, with most areas having fewer than 150 square feet per acre. Irregularly shaped openings with less than 10 percent tree cover make up from 10 to 50 percent of the area. The opening sizes are varied, mostly ranging from 0.05 to 0.5 acre, occasionally greater than 0.5 acre, and contain a mix of grasses, herbaceous plants, shrubs, and young trees. Vigorous shrubs cover 10 to 60 percent of the area. Less than 30 percent of shrubs are decadent with many dead branches. Numbers of seedlings and saplings are sufficient to replace mature and old trees over time, with ponderosa pine regeneration patchy in distribution and occurring in canopy gaps of variable sizes and shapes.
- 04 At the mid- to fine scale, litter and surface fuel is patchy with fewer than 3 to 10 tons per acre in fuel loading on average over 30 to 70 percent of the area. There are some small areas of up to 30 tons per acre and others with fewer than 5 tons per acre.



Figure 5. Examples of ponderosa pine patches

Table 2. Structure within forested patches (10s to 100s of acre areas with similar forest)

Vegetation Type/Zone	Tree Density Basal Area (square feet per acre)	Tree Canopy Cover (percent cover overhead)	Shrubs
Black oak/Ponderosa Pine	20–200; mostly less than 150	10–50; may exceed 50 in small patches	10–60% cover; highly variable; mixed ages
Ponderosa Pine Dry Mixed Conifer	20–200; mostly less than 150	10–50; may exceed 50 in small patches	10–60% cover; highly variable; mixed ages
Moist Mixed Conifer	50–300; mostly less than 200	20–75; may exceed 75 in small patches	10–60% cover; highly variable; mixed ages

- 05 At the mid- to fine scale, snags greater than 20 inches in diameter are patchily distributed and highly irregular in spacing, with 2 to 40 snags per 10 acres at the landscape scale (table 3) providing for future downed logs. Coarse woody debris, including large downed logs in varying states of decay, is patchily distributed and ranges from 1 to 10 tons per acre at the landscape scale (table 3).

Table 3. Snags and large logs in unburned and low to moderate severity burn patches at the landscape scale (tens of thousands of acres)*

Vegetation Type/Zone	Snags larger than 20 inches diameter (per 10 acres)	Logs larger than 15 inches diameter and more than 8 feet long (tons per acre)	Litter and understory dead wood (tons per acre)
Black Oak/Ponderosa Pine Ponderosa Pine Dry Mixed Conifer	2–40	1–10; all decay classes	3–10; patchy
Moist Mixed Conifer	5–40	1–10; all decay classes	3–15; patchy

* Snag and large log densities and surface fuels may exceed the upper limit in small patches especially following moderate severity fire.

Dry Mixed Conifer

Desired Conditions (TERR-DMC-DC)

- 01 At the landscape scale, the dry mixed conifer vegetation type has a mosaic of patches of trees of varied sizes and ages. It is dominated by ponderosa pine or Jeffrey pine, with varying amounts of sugar pine, white fir, incense cedar, or hardwood trees (figure 6).



Figure 6. Examples of dry mixed conifer forest

- 02 At the landscape scale, areas dominated by medium and large-diameter trees comprise more than 60 percent of the landscape. Overstory tree canopy cover is variable and ranges from 10 to 50 percent at a fine scale, with some small patches exceeding 50 percent cover. Trees are denser in some locations, such as north-facing slopes and canyon bottoms, but in small patches in limited areas (less than 20 percent of the area). Vigorous shrubs cover 10 percent or more of the area, with density varying by aspect, slope, and soil type.
- 03 At the mid- to fine scale, vegetation structure is highly variable. Trees of different sizes and ages are variably spaced and comprise an irregular, uneven-aged forest. Individual trees are variably spaced and interspersed with some denser tree clusters and canopy gaps

typically less than 0.2 to 0.5 acre. Tree stocking (basal area) is highly variable, ranging from 20 to 200 square feet per acre, with most areas having fewer than 150 square feet per acre. Numbers of seedlings and saplings are sufficient to replace mature and old trees over time, and pine regeneration is patchy in distribution and occurs in canopy gaps of variable shapes and sizes.

- 04 At the mid- to fine scale, small irregularly shaped openings with less than 10 percent tree cover make up from 10 to 50 percent of the area, and contain a mix of grasses, herbaceous plants and shrubs.
- 05 At the mid- to fine scale, snags greater than 20 inches in diameter are well distributed and highly irregular in spacing, with densities between 2 to 40 snags per 10 acres at the landscape scale (table 3) providing for future downed logs. Coarse woody debris, including large downed logs in varying states of decay, is irregularly distributed and ranges from 1 to 10 tons per acre at the landscape scale. Litter and surface fuel is patchy with fewer than 3 to 10 tons per acre in fuel loading on average over 30 to 70 percent of the area. There are some small areas of up to 30 tons per acre and others with fewer than 3 tons per acre.

Moist Mixed Conifer

Desired Conditions (TERR-MMC-DC)

- 01 At the landscape scale, varying mixtures of Jeffrey or ponderosa pine, white fir, red fir, incense cedar and sugar pine trees occur. Native shrubs and plants are common in the understory (figure 7).



Figure 7. Examples of moist mixed conifer forest

- 02 At the landscape scale, the moist mixed conifer type occurs as a mosaic of forest patches of varied sizes and ages, with a greater proportion of moderate and high canopy cover patches than in drier parts of the landscape. Areas dominated by medium and large diameter trees comprise more than 50 percent of the landscape. Overstory tree canopy cover is highly variable, ranging from 20 to 75 percent, with some small patches exceeding 75 percent cover.
- 03 At the landscape scale, closed-canopied patches are resilient to high intensity fire when they are embedded in larger areas dominated by highly resilient, open forests. These close-canopied patches consist of a combination of mid-story and understory tree and shrub density, and patchy, light to moderate surface fuels. Early seral vegetation, shrubs, grasses, herbs, tree seedlings or saplings mostly occur in very small areas, intermixed within forest stands or patches. Large and old trees are common in much of the landscape in varying densities (see Old Forest section) in all seral stages. Some trees exceeding 40 to 50 inches in diameter occur on more productive sites.
- 04 At the mid- to fine scale, moist mixed conifer forest structure is diverse, with high variation in density and spacing. Trees of different sizes and ages, variably spaced, comprise an irregular, uneven-aged forest with all seral stages present, including old forest. Individual trees are variably spaced and interspersed with some denser tree clusters and canopy gaps typically less than 0.2 to 0.5 acre. Tree stocking (basal area) is highly variable, ranging from 50 to 300 square feet per acre (table 2) with most areas having fewer than 200 square feet per acre. Seedlings and saplings are sufficient to replace mature and old trees over time, but are not uniformly distributed in stands.
- 05 At the mid- to fine- scale, large snags greater than 20 inches in diameter are patchily distributed, averaging 5 to 40 snags per 10 acres at the landscape scale (table 3) providing for future downed logs. Coarse woody debris, including large downed logs in varying states of decay, is patchily distributed and averages fewer than 5 tons per acre at the landscape scale. In patches centered on areas of past tree mortality, coarse woody debris can be up to 10 tons per acre. Litter and surface fuel is patchy, with fewer than 3 to 15 tons per acre in fuel loading on average over 30 to 70 percent of the area.
- 06 At the fine scale, irregularly shaped groups of trees and widely spaced trees are variably spaced with some tight clumps. Vigorous shrub cover varies from 10 to 60 percent of the area. Openings with less than 10 percent tree cover are in various shapes and intermixed with groups of trees. These openings make up 10-30 percent of the area, are typically less 0.5 acre, and contain a mix of grasses, forbs, and shrubs.

All Upper Montane Vegetation Types

Desired Conditions (TERR-UPPR-DC)

- 01 At the landscape scale, fire is a key ecological process in upper montane landscapes, restoring and maintaining patchy fuel loads, and increasing heterogeneity and understory plant vigor. Fires occur regularly to irregularly, depending on vegetation type. Fires in this zone burn with low, moderate, or mixed severity, with dispersed patches of high severity (i.e., greater than 75 percent basal area mortality) generally less than 10 acres and rarely greater than 200 to 250 acres. The proportion of areas burned at high severity within a fire is generally less than 10 to 15 percent.

Red Fir

Desired Conditions (TERR-RFIR-DC)

- 01 At the landscape scale, the red fir forest type is part of a heterogeneous mosaic of tree species and vegetation structures (tree density, size, age and shrub cover), with patches of Jeffrey pine, lodgepole, other forest types, and meadows. It is dominated by red fir trees, with varying amounts of white fir, Jeffrey pine, western white pine, lodgepole pine and sometimes mountain hemlock (figure 8).
- 02 Fires occur every 25 to 80 years as a key ecological process in red fir forests. Fire as an ecological process creates, restores, and maintains ecosystem resilience and increases understory plant vigor, heterogeneity, and habitat diversity.



Figure 8. Examples of red fir forest heterogeneity

- 03 At the landscape scale, areas dominated by medium and large-diameter trees and low to moderate canopy cover (between 10 and 60 percent) comprise most of the landscape (table 4). Trees are denser in some locations such as north-facing slopes and canyon bottoms, near meadows, or where snow accumulates. Early seral vegetation, shrubs, grasses, herbaceous plants, tree seedlings or saplings, mostly occur in very small areas, intermixed within forest stands or patches.

Table 4. Amount of seral stage patches (larger than 10 acre) by vegetation type at the landscape scale (tens of thousands of acres)

Vegetation Type or Zone	Early Seral ¹	Small Tree ²	Open mature forest ³	Intermediate mature forest ⁴	Dense mature forest ⁵
Jeffrey Pine	5–20%	1–10%	60–90%	10–20%	0–10%
Red Fir	5–20%	2–15%	20–70%	20–70%	10–40%
Wet Lodgepole Pine	5–20%	2–15%	5–20%	20–70%	20–70%
Dry Lodgepole Pine	5–20%	2–15%	50–80%	10–30%	0–30%

1. Shrub, grass/herb, tree seedling/sapling.
2. California Wildlife Habitat Relationship system (CWHR) tree size classes 2 & 3.
3. CWHR 4 & 5; 10–40 percent tree cover.
4. CWHR 4 & 5; 40–60 percent tree cover.
5. CWHR 4, 5, & 6, >60 percent tree cover.

- 04 At the landscape scale, shrubs, grasses and young trees grow in patches of dead and dying trees with abundant snags and large logs.
- 05 At the mid- to fine scale, trees of different sizes and ages are variably spaced and comprise an irregular, uneven-aged forest. Individual trees are variably spaced and interspersed with some denser tree clusters and open canopy gaps. Tree stocking (basal area) is highly variable, ranging from 50 to 350 square feet per acre with most areas having fewer than 250 square feet per acre (table 5). Numbers of seedlings and saplings are sufficient to replace mature and old trees as they die, but are very patchy in distribution.

Table 5. Structure within forested patches (10s to 100s of acre areas with similar forest)

Vegetation Type/Zone	Basal Area (square feet per acre)	Tree Canopy Cover (percent cover overhead)	Shrubs
Jeffrey Pine	20–200; mostly less than 150	10–40; may exceed 40% in small patches	0–70% cover; variable, mixed ages
Red Fir	50–350; mostly less than 250	20–75, median 40; highly variable	0–70% cover, variable, mixed ages
Wet Lodgepole Pine	50–280 mostly less than 150	20–70; generally 40–60%	0–70% cover, variable, mixed ages
Dry Lodgepole Pine	20–200; mostly around 120	10–40; may exceed 40% in small patches	0–70% cover, variable, mixed ages

- 06 At the mid- to fine scale, small openings mostly less than 0.1 to 0.5 acre are intermixed within stands of trees; they make up 5 to 20 percent of the area within tree stands, have less than 10 percent tree cover, are irregularly shaped, and often contain herbaceous plants, shrubs, and tree seedlings and saplings. Some openings and the understory of some red fir patches have little to no understory plants but instead have a high diversity of mushrooms and other fungi.
- 07 At the mid- to fine scale, snags greater than 20 inches in diameter are distributed in patches. An average of 5 to 40 snags per 10 acres at the landscape scale (table 6) provide for future downed logs. Coarse woody debris, including large downed logs in varying

states of decay, is distributed in patches and ranges from 1 to 10 tons per acre at the landscape scale. Litter and surface fuel is patchy with fewer than 5 to 20 tons per acre in fuel loading on average. There may be areas with no fuels and pockets of high fuel accumulation scattered irregularly.

Table 6. Snags and large logs in unburned and low to moderate severity burn patches at the landscape scale (tens of thousands of acres)*

Vegetation Type/Zone	Snags larger than 20 inches diameter per 10 acres	Snags larger than 30 inches diameter per 10 acres	Logs larger than 15 inches diameter and more than 8 feet long (tons per acre)	Litter and Understory dead wood (tons per acre)
Jeffrey Pine	2–40	NA	1–10, all decay classes	3–10; patchy
Red Fir	5–40	1–10	1–10; all decay classes	5–20, patchy
Wet Lodgepole Pine	5–40	NA	1–20; all decay classes	5–30, patchy
Dry Lodgepole Pine	2–25	NA	1–10; all decay classes	2–10; patchy

NA = not applicable

* Snag and large log densities and surface fuels may exceed the upper limit in small patches especially following moderate severity fire.

Lodgepole Pine

This vegetation type is divided into dry lodgepole pine versus wet lodgepole pine. Dry lodgepole pine dominates on upper montane dry sites generally above 8,500 feet elevation, often located on benches, upper topographic positions,⁵ and moderate slopes. Stands are typically in broken terrain and shallow, drier, and nutrient-poor soils. Western white pine may be present, but mesic tree species (such as red fir or mountain hemlock) are generally absent or infrequent. Understory herbaceous plant cover is generally less than 30 percent and bare ground and rock cover is generally more than 30 percent. Either wet or dry lodgepole may border some meadow ecosystems, depending upon the ecological setting.

Wet lodgepole pine dominates on upper montane wet sites generally above 7,500 feet elevation, often located on gently rolling lower slopes and drainage bottoms. Stands are located on relatively productive, moister, and deeper soils in the upper montane zone. Red fir or mountain hemlock may be present in wet lodgepole pine stands. Understory herbaceous plant cover is generally more than 30 percent and bare ground and rock cover is generally less than 30 percent. Either wet or dry lodgepole may border some meadow ecosystems, depending upon the ecological setting.

Desired Conditions (TERR-LDGP-DC)

- 01 Lodgepole pine forests are highly variable throughout the landscape, occurring as open forests on dry sites at higher elevations, and as denser stands in pockets around meadows, lakes or where cold air accumulates. The lodgepole pine type is part of a heterogeneous mosaic of tree species with diverse structural conditions. It is dominated by lodgepole

⁵ Area near the top of a slope or ridgetop.

- pine, with varying amounts of red fir, white fir, aspen, and sometimes white pines (such as western white pine).
- 02 Fires occur every 30 to 100 years as a key ecological process in lodgepole pine forest. Fire as an ecological process creates, restores, and maintains ecosystem resilience and increases understory plant vigor, heterogeneity, and habitat diversity.
 - 03 The distribution and structure of wet lodgepole pine forests are variable, ranging from small patches of even-aged trees, with both closed and open canopies, to uneven-aged, irregular patches. Size and age class diversity is high within wet lodgepole pine stands. Individual trees are variably spaced with some tight groups. Irregularly shaped groups of large and intermediate trees are variably sized, with some overlapping tree crowns. Smaller trees are randomly distributed.
 - 04 In wet lodgepole pine forests, areas dominated by medium- and large-diameter trees comprise more than 45 percent of the landscape (table 4). Tree stocking (basal area) is highly variable, ranging from 50 to 280 square feet per acre, with most less than 150 square feet per acre (table 5). Canopy cover ranges from 20 to 70 percent but is generally 50 percent. Small openings with less than 10 percent tree cover are irregular in shape, and make up from 5 to 20 percent of the area and contain a mix of grasses, herbaceous plants, and shrubs. Sufficient tree regeneration in openings provides for stand replacement.
 - 05 In wet lodgepole pine forests, large snag densities are between 5 and 40 snags per 10 acres at the landscape scale (table 6). Snags are well distributed, highly irregular in spacing, and provide for future downed logs. Coarse woody debris, including large downed logs in varying states of decay, is well distributed but irregular in spacing and ranges from 1 to 20 tons per acre at the landscape scale. Some small areas contain very high fuel loading of up to 30 tons per acre and other areas have fewer than 5 tons per acre.
 - 06 The distribution and structure of dry lodgepole pine forests are variable but typically open, with irregular patches of trees of different ages and generally few overlapping tree crowns. Smaller trees are randomly distributed. Tree groups may contain other tree species such as western white pine. Regenerating trees in suitable but irregularly distributed sites eventually create new stands.
 - 07 In dry lodgepole pine forests, areas dominated by medium- and large-diameter trees comprise more than 60 percent of the landscape (table 4). Canopy cover is generally 10 to 40 percent but may exceed 40 percent in small patches and moist microsites (table 5).
 - 08 Within dry lodgepole pine patches, individual trees are variably and often widely spaced. Tree stocking (basal area) is highly variable with most stands having around 120 square feet per acre but ranging from 20 to 200 square feet per acre. Small openings with less than 10 percent tree cover are irregular in shape and make up from 10 to 50 percent of the area and contain a mix of bare ground, rock, grasses, herbaceous plants and shrubs.
 - 09 In dry lodgepole stands, the understory can contain between 0 to 40 percent shrub cover and on very dry, cold rocky sites there may be no shrub cover.
 - 10 In dry lodgepole pine forests, large snag densities are between 2 to 25 snags per 10 acres at the landscape scale (table 6). Snags are well distributed, highly irregular in spacing, and provide for future downed logs. Coarse woody debris, including large downed logs in varying states of decay, is well distributed but highly irregular in spacing, ranging from 1

to 10 tons per acre at the landscape scale. Surface fuel loads are highly variable and patchy. Some small areas contain higher fuel loading of up to 15 tons per acre and most areas have fewer than 8 tons per acre.

Upper Montane Jeffrey Pine

Desired Conditions (TERR-JEFF-DC)

- 01 At the landscape scale, the Jeffrey pine type is part of a heterogeneous mosaic of upper montane forests, shrublands, and other vegetation types. Forests are dominated by Jeffrey pine trees and are generally open. Open-canopied stands dominate the landscape, with generally less than 10 percent of the area having more than 40 percent canopy cover. Open canopies allow shade-intolerant Jeffrey pine tree regeneration (figure 9).



Figure 9. Example of a Jeffrey pine patch

- 02 Fire is a key ecological process, creating a diversity of vegetation types, maintaining understory plant diversity and lowering surface fuels. Fires occur frequently, every 10 to 15 years, with mostly low and moderate vegetation burn severity.
- 03 At the mid-scale, Jeffrey pine forests are primarily composed of mostly open canopies, with variable patches of trees, scattered individual trees, and open canopy gaps.
- 04 At the mid-scale, Jeffrey pine forest is composed predominantly of vigorous trees, but declining trees are an important component, providing wildlife nesting and denning habitat, future production of snags, down logs, and other coarse woody debris.
- 05 At the mid-scale, insects and pathogens like dwarf mistletoe, *Annosus* and *Armillaria* root diseases, and Jeffrey pine beetle, occur at background levels and are restricted to individual stands. Witches' brooms provide habitat for wildlife species.

- 06 At the fine scale, size and age class diversity is high within Jeffrey pine stands. Individual large trees or tree groups provide nesting and denning habitat for wildlife.
- 07 At the fine scale, openings of various shapes surround and are intermixed with trees. These gaps make up from 10 to 70 percent of the area, are typically less than 0.2 to 0.5 acre, and contain herbaceous plants, shrubs and tree regeneration.

Montane Chaparral

Desired Conditions (TERR-MCHP-DC)

- 01 Chaparral consists of native shrub and understory species that reflect the natural range of variation for the site. The chaparral vegetation type is composed of varying age classes and densities that protect against accelerated erosion, with 2 to 20 percent of the type in early seral grass and herbaceous cover, 5 to 20 percent in native herbs and shrubs, and 70 to 95 percent in dense shrubs.
- 02 Chaparral is in a constant state of transition from young to older stages and back again, with fire as the primary disturbance. High-severity fires that kill most aboveground stems occur on average every 35 to 100 years. The fire return interval is long enough to allow the soil seed bank of uniquely adapted plants that follow fire to be maintained over short and long terms. Fuels are able to accumulate sufficiently in areas to carry fire in the areas of fire-adapted plants. Invasive nonnative plants do not dominate between fires.

Aspen

Desired Conditions (TERR-ASPEN-DC)

- 01 The structure, function, and composition of aspen stands are within the natural range of variation; there is a wide age and size class distribution of aspen and it is contributing to habitat and biodiversity. Aspen is successfully regenerating.
- 02 Fire occurs as a key ecological process in aspen stands, maintaining ecosystem resilience and promoting aspen regeneration. Fire or silvicultural activity reduces conifer encroachment and competition. Aspen stands are resilient to and periodically regenerated by moderate to high-severity fires or other disturbances, allowing for potential expansion.
- 03 Aspen groves contribute to social and economic sustainability by supporting recreational, cultural, and economic opportunities. Aspen groves add visual interest, variety, and contrasts in the landscape, providing spiritual respite and enjoyment.

Standard (TERR-ASPEN-STD)

- 01 Browsing pressure should be reduced in aspen stands where aspen regeneration is not recruiting to larger size classes or aspen regeneration is limited due to browsing impacts.

Guidelines (TERR-ASPEN-GDL)

- 01 Where pile burning of material from conifer removal is desired, piles should be removed from overstory aspen tree roots where possible or be kept at least 15 feet away from large aspen trees to limit damage to aspen trunks and roots. Larger piles (more than 10 feet pile width) should be placed at least 20 feet away from aspen trunks to minimize damage to aspen.

- 02 During treatment to manage or restore aspen, aspen trees with historical carvings should be protected or recorded and the historical value appropriately documented.
- 03 Near developed areas, conifer removal (mechanical or hand thinning) should be the primary initial restorative treatment for aspen stands. To manage residual fuel loading where cut material cannot be removed from the stand, pile burning may be used.
- 04 The number and size of conifers removed to enhance aspen should be based on the following long-term objectives:
 - a. maximize direct and indirect light (this may require treating beyond the existing aspen stand perimeter);
 - b. allow aspen expansion;
 - c. reduce seed sources of shade-tolerant conifers;
 - d. maintain fuel loads, including reduced coarse woody debris, that promote resilient aspen stands to allow future prescribed burning; and
 - e. promote wildlife habitat, plant assemblages, and water yields typically found in functioning aspen communities.

Subalpine and Alpine Zones

Desired Conditions (TERR-ALPN-DC)

- 01 Subalpine woodlands are highly variable in structure and composition. Diverse patch types vary from open woodlands with scattered trees to small, dense groves.
- 02 Fires occur infrequently, generally once every 100 years or longer, are mostly very small, and burn with mixed severity. Fire intensity is highly variable, but crown fires are usually limited in size.
- 03 Subalpine woodlands are resilient to insects, diseases, fire, wind, and climate change. High-elevation white pines (whitebark pine, limber pine, and foxtail pine) are healthy and vigorous, with a low incidence of white pine blister rust, and resilient to moisture stress and drought. White pine blister rust-resistant trees are regenerating, and populations of high-elevation white pines have the potential to expand above the tree line.
- 04 Mature cone-bearing whitebark pine trees are spatially well distributed to produce and protect natural regeneration and conserve genetic diversity.
- 05 Alpine ecosystems are resilient to climate change, and fires are small and occur infrequently.

Old Forest

Old forests are characterized by the presence of large and old trees for the given forest type and site productivity. Old forests vary widely based on forest type, soil condition, topography, and fire history. For ponderosa pine or mixed conifer forests, trees greater than 20, 30 or 40 inches in diameter contribute to old forest structure (table 7). In contrast, at the highest reaches of trees near the Sierra Nevada crest, whitebark pine trees that are 10 inches in diameter may be several centuries old or older. Very large trees that are greater than 50 inches in diameter are also part of the desired condition, their densities are not included in table 7 because they were heavily harvested in the late 1800s and the earlier 1900s and information is lacking on their historic densities. Desired densities of trees greater than 20 inches in diameter are included for oaks and

upper montane forests. These trees are often old and at the high end of their potential size. The old forest management direction below focuses on old forests in the montane and upper montane ecological zones where most vegetation management has occurred in the past and continues to occur.

Old forests often contain large snags and logs in addition to large live trees. The density of these old forest components vary widely. Old forests within montane mixed conifer and pine vegetation types are currently more uniformly dense than they were in the past, resulting in increased rates of old growth tree mortality from competition with younger trees, climate change, insect-related mortality and uncharacteristic wildfire. At the same time, the denser forests with old growth trees are favored habitat of the California spotted owl, Pacific fisher and Sierra marten.

Desired Conditions (TERR-OLD-DC)

- 01 The composition, structure, and functions of old forests and surrounding landscapes are resilient to fire, drought, insects, pathogens, and climate change. Fire occurs as a key ecological process in forest types that are adapted to fire, creating, restoring and maintaining ecosystem resilience and fire-related composition and structure.
- 02 The landscape contains a mosaic of vegetation types and structures that provide foraging and breeding habitat, movement, and connectivity for a variety of old forest-associated species.
- 03 Between 40 and 80 percent of the forested landscape contains old forest areas. Old forest areas are clumps and patches of old forest components such as old trees, snags, and large downed logs. These areas are irregularly distributed across the landscape and interspersed with stands of younger trees, shrubs, meadows, other herbaceous vegetation, and unvegetated patches.
- 04 The number and density of old trees vary by topographic position and soil moisture. In general, more large and old trees are found on moister sites; on lower slopes, bottoms, and north and east aspects, especially where soils are deeper. Large trees are well distributed but are often clumpy. The densities vary by forest type as shown in table 7. Trees greater than 40 inches in diameter, generally over 150 years old, represent the oldest trees, and comprise a significant proportion of large and old trees. In many areas of high soil productivity, trees grow to large sizes (around 30 inches in diameter) in fewer than 100 years. On low and very low soil productivity sites, the oldest trees may be smaller in diameter. Sufficient numbers of younger trees are present to provide for recruitment of old trees over time.
- 05 Old forests are composed of both vigorous trees and decadent trees. Clumps of large trees, snags, large logs, and decadent older trees are maintained on the landscape in sufficient numbers to benefit wildlife and are distributed throughout the planning area, considering constraints imposed by climate change, fire, insects, disease, and drought.
- 06 Large snags are scattered across the landscape, generally occurring in clumps rather than uniformly and evenly distributed, meeting the needs of species that use snags and providing for future downed logs.
- 07 Coarse woody debris is distributed in patches and the density of large downed logs varies by vegetation type. Surface dead wood levels are sufficient to provide for wildlife and legacy soil microbial populations.

Table 7. Large/old trees at landscape scale, except where high severity fires have occurred (greater than 75 percent basal area mortality)

Vegetation Type/Zone	Larger than 20 inches diameter trees per acre	Larger than 30 inches diameter trees per acre	Larger than 40 inches diameter trees per acre	Proportion of the landscape with large and/or old trees
Dry Mixed Conifer	4–32	3–20	2–7	40–80%
Moist Mixed Conifer	4–40	4–20	4–12	40–80%
Jeffrey Pine	2–16	1–8	1–4	40–80%
Red Fir	4–40	4–20	4–12	40–80%
Wet Lodgepole Pine	4–12	4–12	not applicable*	40–80%
Dry Lodgepole Pine	2–6	2–6	not applicable*	40–80%

*Trees of this size class are considered rare and variable in distribution, so there is no numeric range that applies to these types.

Guidelines (TERR-OLD-GDL)

- 01 When large tree densities meet desired condition levels, thinning to increase heterogeneity and resilience should emphasize retention of the oldest and largest trees, especially pines and black oaks. Large trees with deformities, broken tops, large branches, and cavities should be retained for wildlife habitat whenever possible.
Exceptions: Does not apply in community buffers where there is no overlap with the wildlife habitat management area.
Does not apply to community wildfire protection zones where there is no overlap the wildlife habitat management area.
- 02 Firing patterns, burn unit layout, and other firing and holding methods during burning should limit the killing of large old trees and loss of very large snags. Consider preventing delayed tree mortality caused by smoldering at the base of large old trees and consider constructing fireline around large old trees and very large snags to reduce the risk of tree ignition while addressing firefighter safety. Limit fire intensity in areas with large old trees and very large snags where possible.
Exceptions: Does not apply in community buffers where there is no overlap with wildlife habitat management area.

Complex Early Seral Habitats

Complex early seral management direction below applies to actively managed montane and upper montane forests, including ponderosa pine, mixed conifer, Jeffrey pine, red fir and lodgepole pine forest types. Complex early seral habitat is the stage of forest development that follows a significant mortality event in a mature forest (where the loss is greater than 75 percent of the basal area) and contains structural, compositional, or functional elements of complexity. Examples of major disturbance events include high severity fire and large-scale insect outbreaks. The death of overstory trees creates canopy openings that allow other plants and tree seedlings to reoccupy the site. Complex early seral habitat is often characterized by higher and variable densities of snags and logs, sufficient tree regeneration for forest succession, spatial heterogeneity in vegetation structure and composition, and variability in the timing of functional processes during post-disturbance recovery.

Desired Conditions (TERR-CES-DC)

- 01 Complex early seral habitat contains a sufficient abundance and distribution of snags (especially large-diameter snags) for cavity-nesting wildlife, variable densities of native shrubs and herbaceous plants, and resprouting oak and aspen where they occur.
Exceptions: Does not apply in community buffers where there is no overlap with the wildlife habitat management area.
Does not apply to community wildfire protection zones where there is no overlap with the wildlife habitat management area.
- 02 Snags, logs, and live trees are widely and variably distributed where vegetation has been severely burned (greater than 75 percent mortality) in large patches (greater than 100 acres) to provide habitat while also considering the need for other resource objectives. Such resource objectives could include removal of hazard or salvage trees, reforestation to contribute to future forested conditions and carbon carrying capacity, and strategic fuel treatment, including management of fuels in and adjacent to community wildfire protection zones.
Exceptions: Does not apply in community buffers where there is no overlap with wildlife habitat management area.
Does not apply to community wildfire protection zones where there is no overlap the wildlife habitat management area.

Guidelines (TERR-CES-GDL)

- 01 Post-disturbance restoration projects should be designed to reduce potential soil erosion and the loss of soil productivity caused by loss of vegetation and ground cover.
- 02 Post-disturbance restoration projects should be designed to protect and restore important wildlife habitat.
- 03 Post-disturbance restoration projects should be designed to manage the development of fuel profiles over time.
- 04 Post-disturbance restoration projects should be designed to recover the value of timber killed or severely injured by the disturbance.
- 05 Large fires with more than 1,000 acres of contiguous blocks of high vegetation burn severity in forest vegetation types (ponderosa pine, Jeffery pine, dry or mesic mixed conifer, and red fir) should retain at least 10 percent of the high vegetation burn severity area without harvest to provide areas of complex early seral habitat.
Exceptions: Does not apply in community buffers where there is no overlap with wildlife habitat management area.
Does not apply to community wildfire protection zones where there is no overlap the wildlife habitat management area.

Special Habitats

Special habitats are generally small scale habitat or vegetation types that may support unique assemblages of plants and animals, especially at-risk species. Special habitats typically include uncommon rock types, harsh soils or rock outcrops. Examples include dry sandy and gravelly soils, limestone or serpentine soils, alkali or acidic soils, metamorphic, volcanic or granitic rocky soils or rock outcrops, caves, and alpine talus or fell fields. Many at-risk plant and animal species are found in rocky or gravelly habitats; the plan area has an abundance of exposed granitic rock, but only some areas are habitat for at-risk species. Given the localized nature of these special

habitats, they are challenging to address comprehensively at the national forest scale since they may be uniquely affected by different activities or trends in ecological conditions. For example, restoring the composition and structure of a red fir forest where outcrops are present would not automatically restore desired ecological conditions on the outcrops.

Aquatic and riparian special habitats (desert springs, seeps, and fens) are considered “special aquatic features” and relevant plan components are in the “Riparian Conservation Area” section.

Desired Conditions (TERR-SH-DC)

- 01 The integrity of special habitats is maintained or improved from current conditions. Composition, diversity, and structure of unique plant assemblages are maintained in all areas, including those with multiple-use activities.
- 02 Microclimate or smaller-scale habitat elements provide habitat and refugia for species with a specific geographic or restricted distribution.
- 03 Conditions remain suitable for long-term sustainability of the suite of native plants adapted to special habitats and their associated symbiotic associations, such as insect pollinators.

Standard (TERR-SH-STD)

- 01 At the project scale, evaluate and incorporate maintenance and enhancement needs for special habitats into project design and implementation.

Animal and Plant Species

This and subsequent sections under this heading include plan direction designed to maintain the diversity of plant and animal communities and support the persistence of native species within the plan area, subject to the extent of Forest Service authority and the inherent capability of the plan area. This includes plan components that address the needs of at-risk species within the plan area. At-risk species include (1) federally listed threatened, endangered, proposed, or candidate species under the federal Endangered Species Act, and (2) species of conservation concern.⁶ This section also includes direction that provides for the sustainable use and enjoyment of fish, wildlife, and plants.

For each species or group of species, the forest plan considers the extent that plan components provide for ecosystem integrity and diversity to meet the ecological conditions necessary for those species within their range. Species-specific plan components are added as needed. Additional direction is provided for special habitats under the “Terrestrial Ecosystems” section to address unique habitats of some at-risk species.

Desired conditions are either forestwide or specific to the habitat of the species in question. For the California spotted owl and Pacific fisher, desired conditions are based on their respective conservation assessment and science synthesis, and the broad array of science concerning the species and the risks they face. Some desired conditions are more focused on the short-term risks identified in the fisher Conservation Strategy and the California Spotted Owl Assessment, while

⁶ The Regional Forester’s species of conservation list is dynamic and may be periodically updated. The current Regional Forester’s species of conservation concern list for the Sierra National Forest can be found on the Pacific Southwest Region’s website at <http://www.fs.usda.gov/main/r5/landmanagement/planning>.

others, particularly those in the wildlife habitat management areas, are more dedicated to the long-term sustainability of the species and their habitat.

Forestwide Components for Animal and Plant Species

Desired Conditions (SPEC-FW-DC)

- 01 Persistent populations of native, and desirable nonnative, plant and animal species are supported by healthy ecosystems, essential ecological processes, and land stewardship activities, and reflect the diversity, quantity, quality, and capability of natural habitats on the National Forest. These ecosystems are also resilient to uncharacteristic fire, climate change, and other stressors, and this resilience supports the long-term sustainability of plant and animal communities.
- 02 Ecological conditions for at-risk species support self-sustaining populations within the inherent capabilities of the plan area, including minimizing impacts from threats (such as disease and other site-specific threats). Ecological conditions provide habitat conditions that contribute to the survival, recovery, and delisting of species under the Endangered Species Act; preclude the need for listing new species; and improve conditions for species of conservation concern.
- 03 The structure and function of the vegetation, aquatic and riparian system, and associated microclimate and smaller scale elements of special habitats (like carbonate rock outcrops) exist in adequate quantities within the capability of the plan area to provide habitat and refugia for at-risk species with restricted distributions.
- 04 The Sierra National Forest provides high quality hunting and fishing opportunities. Habitat for nonnative fish and game species is managed in locations and ways that do not pose substantial risk to native species, while still contributing to economies of local communities.
- 05 Residents and visitors have ample opportunities to experience, appreciate, and learn about the Sierra National Forest's wildlife, fish, and plant resources.

Goals (SPEC-FW-GOAL)

- 01 Communicate, collaborate, and cooperate with other agencies, Tribes, partners and private landowners to encourage resource protection and restoration of ecological conditions that benefit wildlife, fish, and plants across ownership boundaries.
- 02 Collaborate with the California Department of Fish and Wildlife to consider potential disturbance factors to deer and to consider habitat management opportunities.
- 03 Work with the California Department of Fish and Wildlife (following the memoranda of understanding) and U.S. Fish and Wildlife Service to restore and maintain essential habitat for at-risk species and implement other recovery actions according to species recovery plans.
- 04 Participate in development of the regional whitebark pine conservation and restoration strategy in collaboration with other Federal agencies, research organizations, and other partners.
- 05 Coordinate with State and Federal agencies and other partners to provide education materials and best management practices information for the public and permittees to limit the potential spread of disease to caves and mines used by bats.

- 06 Coordinate with local, State, and Federal law enforcement and other agencies to remove and remediate poisonous substances and pesticides associated with marijuana cultivation in the wildland.
- 07 Coordinate with adjacent landowners to modify open pipes and other potential wildlife traps to reduce wildlife mortality.

Standard (SPEC-FW-STD)

- 01 Where pesticide applications are proposed within 500 feet of known occupied sites for Yosemite toad, Sierra Nevada yellow-legged frog, mountain yellow-legged frog, and for other aquatic and riparian at-risk species, design applications to avoid adverse effects to individuals and their habitats.

Guidelines (SPEC-FW-GDL)

- 01 Design features, mitigation, and project timing considerations should be incorporated into projects that may affect habitat for at-risk species where they occur to minimize impacts to ecological conditions that provide for the persistence of at-risk species.
- 02 Known nest, roost, or den trees used by species of conservation concern, including surrounding trees that provide beneficial thermal or predatory protection, should not be purposefully removed, with the exception of the reasonably unavoidable removal of hazard trees and as required to meet other State or Federal regulatory requirements.
- 03 To minimize disturbance to deer breeding and fawning, vegetation treatments should include minimization actions developed in coordination with the California Department of Fish and Wildlife in key summer range areas from May 15 through July 15, and during rutting season in key winter range areas from November 15 through January 1 (refer to most current California Department of Fish and Wildlife deer range maps).
- 04 Habitat management objectives and nonhabitat recovery actions from approved recovery plans should be incorporated, if appropriate, in the design of projects that will occur within federally listed species habitat to contribute to recovery of the species.
- 05 Habitat management objectives or goals from approved conservation strategies or agreements should be incorporated, if appropriate, in the design of projects that will occur within at-risk species habitat.
- 06 Water developments (such as a diversion or well) should be avoided near streams, seeps, and springs where there is high risk of dewatering aquatic and riparian habitats where at-risk species occur.

Potential Management Approaches

- Develop and implement a consistent, systematic, biologically sound program for plant species of conservation concern and their habitat.
- Incorporate the conservation of at-risk species into all program areas at appropriate times and scales, including but not limited to recreation, fire and fuels, vegetation management, minerals, range, engineering, facilities, and special uses.
- Reduce human-caused mortalities associated with illegal marijuana growing and rodenticide use, road-related mortalities, and mortalities associated with water pipes and tanks.

- Develop a regional whitebark pine conservation and restoration strategy in collaboration with other Federal agencies, research organizations and other partners.
- Groups and clumps of large trees, snags and downed logs are preferentially retained along forest edges to provide habitat and roost sites for wildlife species, such as small mammals, cavity-nesting birds, and tree-dwelling bats.

California Spotted Owl

Plan components for California spotted owl apply either to protected activity centers, territories, or the specific nest or roost site. Where plan components apply is identified in the wording of the plan components themselves. Protected activity centers are intended to meet the direct habitat needs that support successful reproduction of breeding owls. They encompass habitat that is most likely essential for nesting and roosting but not for foraging or territorial defense. Territories are areas defended by the resident pair of owls from other owls of the same species and include foraging and other important habitat.

Because of the need to protect firefighter safety, many of the management constraints within protected activity centers do not apply within community buffers. Additional exceptions exist within the community wildfire protection zone, where fire risk is greatest and there is a need for fuel treatments within and near communities. These exceptions are explained in the plan components themselves. See the fire section for more on community buffers and strategic fire management zones.

California spotted owl protected activity centers are defined by the following characteristics:

- National Forest System lands surrounding territorial owls based on a documented nest site; recent roost site if nest location is unknown; or central point of repeated daytime detections when neither nest or roost locations are known.
- Best available 300 acres of habitat in as compact a unit as possible, including:
 - ◆ California Wildlife Habitat Relationship (CWHR) system classes 6, 5D, 5M, 4D, and 4M (in descending order of priority);
 - ◆ Two or more tree canopy layers;
 - ◆ Trees in the dominant and co-dominant crown classes averaging 24 inches diameter or greater; and
 - ◆ 60 to 70 percent tree canopy cover, including hardwoods.
- Contains some very large snags greater than 45 inches in diameter and higher than average levels of snags and down woody materials.
- Includes the most sustainable high quality habitat, but may also include habitat outside the natural range of variation that is not likely to be sustainable over the long run to meet near-term habitat needs.

As additional nest or roost locations and habitat data become available, California spotted owl protected activity centers will be reviewed and adjusted as necessary to better include known and suspected nest stands and to encompass more resilient suitable habitat. Protected activity centers should avoid community buffers if possible.

Adjustments may also be made to facilitate projects, as long as the characteristics above are still met. Where feasible, the adjustments will focus on including moister, more productive sites where biophysical conditions are likely to support these conditions in the long term.

California spotted owl protected activity centers can be retired if they are not occupied by territorial owls. They can also be retired when significant physical changes have occurred if there is insufficient suitable habitat to modify the protected activity center boundaries and there is no occupancy by territorial owls.

Occupancy of territorial owls is determined following the most current Region 5 California spotted owl monitoring or survey protocol at the time of surveys. For details on survey requirements for retiring California spotted owl protected activity centers, please refer to the Forest Service Conservation Strategy for the California Spotted Owl. Survey requirements vary based on the situation.

California spotted owl territories are defined by the following characteristics:

- 800-acre circle surrounding territorial owls based on a documented nest site or roost site if nest location is unknown.
 - ◆ Territory boundaries may be adjusted to be non-circular, as needed, to include the most sustainable areas of high-quality habitat and exclude areas less likely to support suitable habitat.
- Contains diverse structural and seral conditions to facilitate nesting, roosting, and foraging.
- May overlap adjacent territories.

Territories are established and retired together with protected activity centers.

Desired Conditions (SPEC-CSO-DC)

- 01 California spotted owl protected activity centers provide high quality habitat that contributes to their successful reproduction. Protected activity centers encompass habitat that is most likely essential for nesting and roosting. The habitat has a high canopy cover with multiple layers of tree canopy and many large trees and snags.
- 02 Within protected activity centers, canopy cover, basal area, and large tree density tends towards the upper end of the range of forest vegetation desired conditions.
- 03 Where the majority of a California spotted owl protected activity center contains dry vegetation types, the vegetation is resilient towards fire, drought, insects and pathogens, and is trending towards terrestrial ecosystem desired conditions.
- 04 At least 40 to 60 percent of each occupied California spotted owl territory consists of the highest quality nesting and roosting habitat. These acres are in large enough patches to provide interior stand conditions, generally 1 to 2 tree heights from an edge. For areas where multiple territories comprise more than 75 percent of a watershed (typically a HUC 8 unit and larger than 10,000 acres) the desired condition is to maintain at least 30 to 50 percent of the watershed in the mature tree habitat at moderate and high canopy cover.

- 05 The Sierra National Forest supports conditions for a sustainable network of dynamic, resilient, and widely distributed California spotted owl nest or roost sites across heterogeneous landscapes.

Suitability (SPEC-CSO-SUIT)

- 01 California spotted owl protected activity centers are not suitable for timber production. Timber harvest is allowed for other multiple-use purposes including safety, and restoration towards desired conditions.

Standards (SPEC-CSO-STD)

- 01 Do not mechanically treat within the 10-acre area surrounding the nest, or known roost site where nest site is unknown.
- 02 Mechanical vegetation treatments that do not reduce habitat quality are allowed within protected activity centers. However, mechanical vegetation treatments that reduce habitat quality are limited to no more than one third of the protected activity center. If habitat quality reduction is necessary, treatment must increase the stand quadratic mean diameter and maintain a minimum of 50 percent canopy cover, habitat quality must be maintained in the highest quality nesting and roosting habitat (CWHR 6, 5D, 5M), and habitat quality must increase again after treatment.
- 03 In California spotted owl territories, design vegetation treatments to retain clumps or groups of large trees, some with dense tree cover, in a well-distributed and irregular pattern. Design treatments for individual trees, clumps of trees, and openings and focus on promoting large trees greater than 24 inches in diameter and especially very large trees 30 inches in diameter or larger. In territories that do not currently meet the territory desired condition (DC-04), do not reduce habitat quality in the existing large tree habitat (CWHR 5D and 5M) wherever it exists in the territory.

Exceptions:

Does not apply in community buffers.

Does not apply in community wildfire protection zones where there is no overlap with the wildlife habitat management area.

- 04 For all treatments within protected activity centers, maintain connectivity between the rest of the protected activity center and habitat around the known nest site or, where the nest site is not known, the most recent known roost site.
Exception: Does not apply in community buffers.
- 05 Where prescribed fire is used in protected activity centers, apply mitigation measures as needed to minimize loss of or damage to known nest and roost trees.
- 06 Where prescribed fire is used in California spotted owl territories, design burns so high-severity burn patches are generally less than 10 acres and do not exceed 100 acres to minimize long-term impacts on habitat.
- 07 Design fuels treatments in protected activity centers to manage for lower intensity fire effects (generally flame lengths averaging 4 to 6 feet) to reduce surface and ladder fuels and minimize impacts to overstory canopy, which will provide conditions for continued use of nesting and roosting.

Guidelines (SPEC-CSO-GDL)

- 01 To minimize disturbance that may lead to breeding failure, during the breeding season (March 1 to August 15 or following current regional guidance) apply a limited operating period prohibiting:
 - a. mechanical harvest within approximately 0.25 mile of the nest or known roost site;
 - b. Prescribed burning within 500 feet of the nest
- 02 The limited operating period may be modified or waived:
 - a. Waived if nesting owls are absent.
 - b. Waived for activities addressing public safety issues.
 - c. Waived for activities of limited scope and duration, if a biologist determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location.
 - d. The limited operating period buffer distance may be modified based upon a biologist's evaluation of the area needed to shield a nest site from disturbance considering topographic features, vegetation or other screening.
 - e. Waived or modified when benefit to California spotted owl habitat resilience outweighs potential short term risk.
 - f. Waived or modified in up to 10 percent of protected activity centers per year per national forest where necessary to facilitate the benefits of using early season prescribed fire.

Exception: Does not apply in community buffers where they do not overlap with the wildlife habitat management area.

- 03 Use information on occupancy and based upon areas with the highest risk of large-scale, high severity wildfire or severe tree mortality from insects and drought when prioritizing protected activity centers for treatment where treatment is deemed necessary.
- 04 Priority based on occupancy:
 1. Currently unoccupied and historically occupied by territorial singles only.
 2. Currently unoccupied and historically occupied by pairs.
 3. Currently occupied by territorial singles.
 4. Currently occupied by pairs.
 5. Currently or historically reproductive.

- 05 Design treatments to maintain and promote the highest quality nesting and roosting habitat available.

Exceptions:

Does not apply in community buffers.

Does not apply in community wildfire protections zone where there is no overlap with the wildlife habitat management area.

Potential Management Approaches

- Prioritize ecological restoration of protected activity centers that have departed furthest from protected activity centers and vegetation desired conditions, and that promote the greatest ecological resilience of the protected activity center. Also consider prioritizing protected activity centers with the highest wildfire risk in the community buffers, such as on upper slopes or ridge tops or in canyons with large areas of chaparral below. Consider the risk of large high-intensity wildfire to clustered protected activity centers, degree of departure from desired condition, and whether some should be managed to reduce wildfire risk and increase overall resilience of protected activity centers and vegetation in an area.
- Within protected activity centers, locate restoration treatments to minimize impacts to the protected activity center while considering opportunities to increase the resilience of the overall network of protected activity centers. Prioritize areas where dry vegetation is most departed from desired conditions and where treatments would provide for the most resilient conditions for the entire protected activity center.

Fisher

Some plan components apply to fisher core areas, fisher linkage areas, and fisher hexagons, which are defined in the most current version of the Southern Sierra Nevada Fisher Conservation Strategy (figure 10). Fisher hexagons are a fixed grid of hexagons used to assess the distribution and connectivity of habitat across the plan area.

Because of the need to protect firefighter safety, many of the management constraints for fisher do not apply within community buffers. These exceptions are explained in the plan components themselves. See the fire section for more on community buffers and strategic fire management zones.

Desired Conditions (SPEC-FSHR-DC)

- 01 Outside of community buffers (see community wildfire protection zone guidelines FIRE-CWPZ-GDL), essential fisher habitat elements, including high value reproductive habitat, are common and well distributed throughout the fisher's range. Elements include large living and dead trees, especially pines and oaks where feasible, and structures used by fishers for resting and denning such as cavities and deformities.
- 02 Black oaks are well distributed within mixed-conifer and conifer-hardwood stands throughout the fisher's range. The majority of trees are in good condition and the number of large oaks is increasing.
- 03 Fisher linkage areas provide connectivity between fisher habitat core areas. Fisher linkage areas support patchy vegetation with some moderate to dense tree canopy cover where site conditions allow, such as along riparian corridors, or shrub cover where forest cover is inadequate.
- 04 Fisher linkage areas have minimal impediments or barriers to fisher movement, allowing fishers to disperse and maintain genetic diversity within and among subpopulations.
- 05 Predation on fishers occurs at natural rates with natural seasonal patterns and does not prevent fisher population growth.

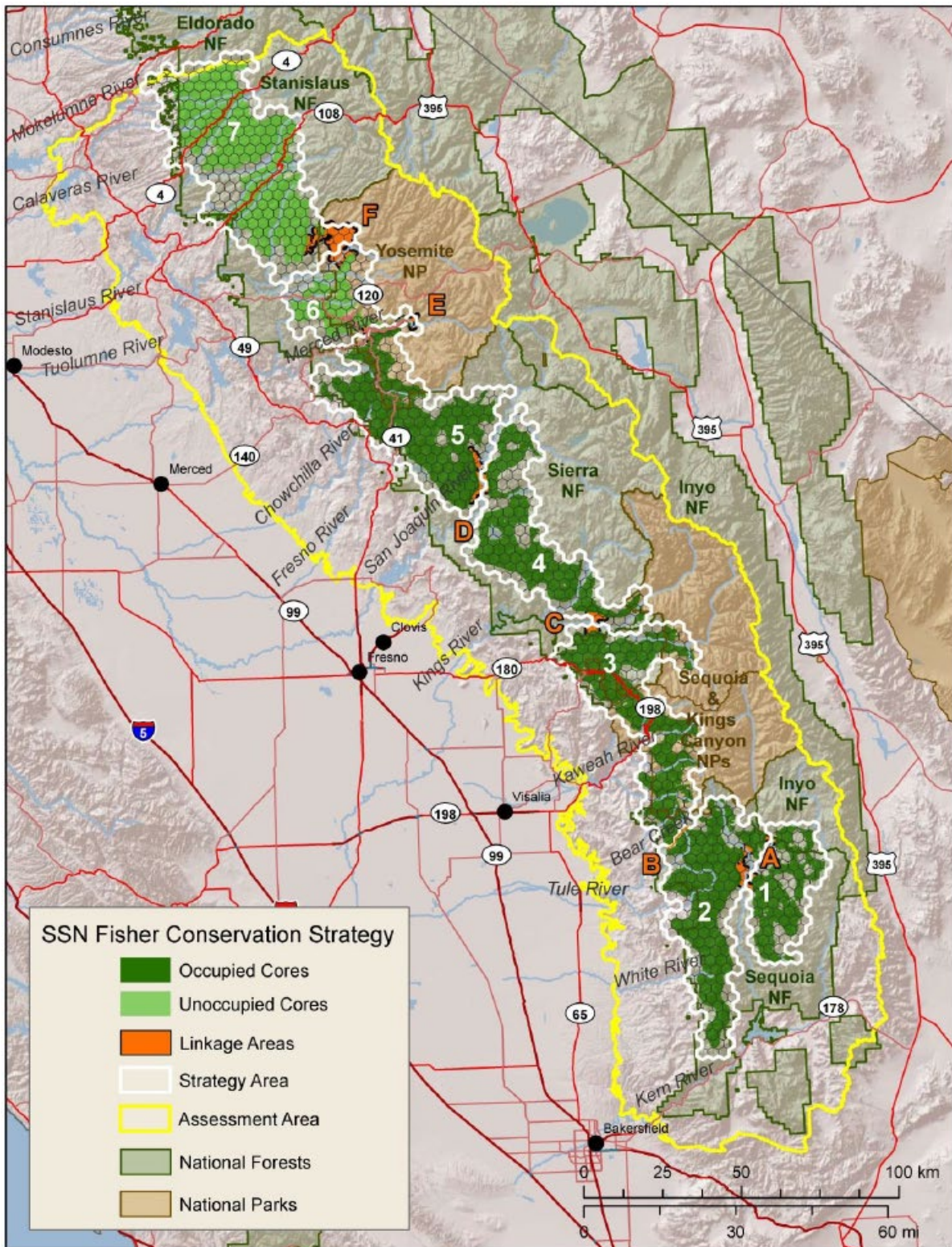


Figure 10. The Southern Sierra Nevada fisher conservation strategy area (white boundary) encompasses modeled fisher habitat core areas and linkage areas based on a grid of female breeding territory-sized (10-km², 4-mi²) hexagonal cells.⁷ Individual habitat core areas are numbered and linkage areas are lettered.

⁷Spencer, W.D., S.C. Sawyer, H.L. Romsos, W.J. Zielinski, C.M. Thompson, and S.A. Britting. 2016. Southern Sierra Nevada fisher conservation strategy. Unpublished report produced by Conservation Biology Institute.

Goal (SPEC-FSHR-GOAL)

- 01 Coordinate with the county roads departments, California Department of Transportation (CalTrans), and other agencies to evaluate opportunities to reduce the rate of fishers hit by vehicles.

Guidelines (SPEC-FSHR-GDL)

- 01 Do not create permanent new linear or otherwise continuous areas of open canopy habitat in or near current modeled fisher denning habitat or near high value reproductive habitat that would isolate the habitat or substantially increase predator access.

Exceptions: Does not apply in community buffers.

Does not apply in community wildfire protection zones where there is no overlap with the wildlife habitat management area.

- 02 Apply the limited operating periods below in occupied fisher habitat cores 4 and 5 to minimize disruptions to fisher reproduction. In fisher cores 4 and 5, the limited operating period applies to most current modeled fisher denning habitat buffered by 820 feet (250 meters).
 - a. Prohibit mechanical logging, thinning, mastication and construction activities from March 1 to June 30, or follow current regional guidance.
 - b. Prohibit using prescribed fire from March 1 to May 1, or follow current regional guidance.

The limited operating period may be modified or waived when a project-specific evaluation determines a low risk to fishers or establishes absence of denning fishers in the project area.

Exceptions: Does not apply in community buffers where there is no overlap with the wildlife habitat management area.

In community buffers where there is overlap with wildlife habitat management area, apply only around areas known or likely to support denning, and prescribed fire is not prohibited.

- 03 Mechanical treatments may occur on up to 30 percent of each affected fisher hexagon within a 5-year period, provided resilience goals for remaining high value reproductive habitat are achievable. Where remaining high-value reproductive habitat is at significant risk of loss or isolation due to lack of resilience, conduct a cost-benefit assessment to determine if benefits to fisher habitat conservation in the long term are likely to outweigh short-term costs.

Exception: Does not apply in community buffers

Potential Management Approach

- Within and adjacent to fisher linkage areas, outside of community buffers, consider reforestation to restore conifer vegetation cover consistent with the vegetation type natural range of variation to recover lost vegetation cover connectivity.

Sierra Marten

Desired Conditions (SPEC-SM-DC)

- 01 Risk of large high-severity fire is reduced from current conditions in marten habitat core areas.

- 02 Within marten core habitat, vegetation is trending toward desired conditions for terrestrial and riparian vegetation.
- 03 Marten habitat is well distributed throughout the marten's range, providing for foraging, denning, and resting habitat and movement across large landscapes.

Guideline (SPEC-SM-GDL)

- 01 Within marten core habitat, retain overtopping and multi-storied canopy conditions in patches consistent with vegetation desired conditions, including some shade-tolerant understory trees such as firs, especially in drainages, swales and canyon bottoms and on north- and east-facing slopes. Retain a patchy mosaic of shrubs and understory vegetation, separated by more open areas, to reduce fuel continuity, increase habitat heterogeneity, support prey, and provide hiding cover, with a goal of 10 to 20 percent shrub cover at the home range scale.

Exception: Does not apply in community buffers.

Potential Management Approaches

- Maintain or increase understory heterogeneity in marten denning habitat to promote hiding cover such as shrub patches, coarse woody debris, and slash piles following vegetation treatments. Design projects to have non-linear edges.
- Avoid or remediate habitat modifications that unnaturally increase marten susceptibility to predation.

Great Gray Owl

Desired Conditions (SPEC-GGO-DC)

- 01 Habitat within great gray owl protected activity centers provide high quality habitat for nesting and roosting that contributes to their successful reproduction. The habitat has forested areas with dense canopy cover, multiple layers, and many large trees and snags. Meadow habitat in a protected activity centers supports a sufficient prey species populations to provide a food source for great gray owls through the reproductive period, and natural structures at the edges of meadows to provide opportunities for hunting perches.
- 02 Great gray owl territory habitat includes forested areas with upper natural range of variation target of large conifer snags or large live oaks.

Guidelines (SPEC-GGO-GDL)

- 01 In meadow areas of great gray owl protected activity centers, manage to enhance habitat for prey species.
- 02 To minimize disturbance that may lead to breeding failure, during the nesting and breeding season (typically February 15 to August 15, or following current Regional guidance), apply a limited operating period of an active great gray owl nest stand (i.e., not during an inactive nesting year) prohibiting:
 - a. Road construction or extensive heavy mechanized equipment within approximately 0.25 miles of the nest or known roost site;
 - b. Power equipment like chainsaws or pole pruners within 300 feet, of the nest site or known roost site;

- c. Discretionary low level helicopter flights over nests;
- d. Discretionary landing of helicopters within 0.25 mile of the nest; or
- e. Extensive hand tool activities like fire line construction for prescribed burning within 300 feet of the nest site.

The limited operating period may be waived for vegetation treatments of limited scope and duration, if a biologist determines chicks have fledged or that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. If a biologist concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the limited operating period buffer distance may be reduced.

Exceptions:

Does not apply to community buffers where there is no overlap with the wildlife habitat management area.

- 03 To provide habitat used by fledglings, retain or recruit pockets of dense canopy cover (greater than 65 percent) around nests and retain some low-hanging limbs, within 650 feet (200 meters) of a nest tree or activity center.

Exceptions:

Does not apply to community buffers.

Does not apply to community wildfire protection zones where there is no overlap with the wildlife habitat management area.

Potential Management Approaches

- When managing for and restoring meadow habitat, remove encroaching trees and create both hard edges (abrupt transition between forest and meadow), and soft edges (areas with a few scattered trees that soften the transition between meadow and forested stands), and provide for potential hunting perches along the edges.
- Vegetation treatments in great gray owl protected activity centers include mechanical, prescribed fire, and hand treatments.

Northern Goshawk

Desired Conditions (SPEC-NG-DC)

- 01 Northern goshawk protected activity centers provide habitat conditions that support nesting and successful reproduction, including dense canopy cover with large trees and old forest characteristics.

Guidelines (SPEC-NG-GDL)

- 01 To minimize disturbance that may lead to breeding failure, during the nesting and breeding season (February 15 to September 15 or follow current regional guidance), apply a limited operating period prohibiting:
 - a. Road construction or extensive heavy mechanized equipment within approximately 0.25 miles of the nest site, unless northern goshawks are not nesting
 - b. Power equipment like chainsaws or pole pruners within 300 feet of the nest site or known roost site;

- c. Low-level helicopter flights or hovering over nests;
- d. Landing of helicopters within 0.25 mile of the nest; or
- e. Extensive hand tool activities like fireline construction for prescribed burning within 300 feet of the nest site.

Where nest site within a protected activity center is unknown, apply the limited operating period to the protected activity center, or determine the nest stand location.

A limited operating period may be waived for vegetation treatments of limited scope and duration, if a biologist determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. If a biologist concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the limited operating period buffer distance may be modified.

Breeding season limited operating period restrictions may be waived, where necessary, to allow for use of early season prescribed fire in up to 5 percent of any northern goshawk protected activity centers per year on a national forest.

Exceptions:

Does not apply in community buffers where they do not overlap with wildlife habitat management areas.

- 02 Use information on occupancy and resiliency (or departure from the natural range of variation) when prioritizing protected activity centers for treatment where treatment is deemed necessary.

Priority based on resilience:

1. Least resilient.
2. Moderately resilient but putting neighboring high quality areas at risk.
3. Most resilient.

Priority based on occupancy:

1. Currently unoccupied and historically occupied by territorial singles only.
2. Currently unoccupied and historically occupied by pairs.
3. Currently occupied by territorial singles.
4. Currently occupied by pairs.
5. Currently or historically reproductive.

Exceptions:

Does not apply to community buffers.

Does not apply to community wildfire protection zones where there is no overlap with the wildlife habitat management area.

Potential Management Approach

- Vegetation treatments in goshawk protected activity centers include mechanical, prescribed fire, and hand treatments.

Willow Flycatcher

Standards (SPEC-WF-STD)

- 01 In willow flycatcher occupied sites receiving late-season grazing, if habitat conditions are not supporting the willow flycatcher or are trending downward, modify or suspend grazing at those sites.
- 02 During allotment management planning or when authorizing livestock or pack stock use, determine occupancy of willow flycatcher in affected meadows larger than 15 acres that have standing water on June 1 and a deciduous shrub component capable of providing willow flycatcher habitat, using established protocols.
- 03 In meadows with occupied willow flycatcher sites, allow only late-season grazing (after August 15) in the entire meadow. This standard may be waived if an interdisciplinary team together with the affected grazing permittee has developed and implemented a site-specific meadow management strategy. The strategy must focus on protecting the nest site and associated habitat during the breeding season and the long-term sustainability of suitable habitat at breeding sites. It may use a mix of management tools, including grazing systems, structural improvements, and other exclusion by management techniques to protect willow flycatcher habitat.

Potential Management Approach

- Evaluate habitat restoration opportunities in willow flycatcher historically occupied meadows that have recent reported detections.

Bighorn Sheep

Desired Conditions (SPEC-SHP-DC)

- 01 An adequate amount of suitable habitat supports persistent populations of bighorn sheep. These habitat patches include unforested openings supporting productive plant communities with a variety of forage species in and near adequate steep rocky escape terrain throughout the elevational range of mountain ranges. These areas meet different seasonal needs for each sex for feeding, night beds, birthing sites, lamb rearing, and migration routes between suitable habitat patches.
- 02 The risk of disease transmission from domestic sheep and goats to bighorn sheep (based upon the best available risk assessment model) is reduced to the maximum extent practicable.

Goal (SPEC-SHP-GOAL)

- 01 Coordinate with the California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, and adjacent national forests to conduct a risk assessment of pack goat use on National Forest System lands and develop mitigation strategies to manage the risk of disease transmission, if needed.

Suitability (SPEC-SHP-SUIT)

- 01 Domestic sheep or goats, including pack goats, are not suitable within the high-risk area of disease transmission to Sierra Nevada bighorn sheep identified in the most recent bighorn sheep risk assessment.

Standards (SPEC-SHP-STD)

- 01 Do not allow domestic sheep or goat grazing or pack goat use adjacent to bighorn sheep populations where relevant bighorn sheep risk assessment models show there is a high risk of contact and spread of disease, unless risks can be adequately mitigated.
- 02 Manage recreation, or other disturbances, where research has found it to cause Sierra Nevada bighorn sheep to avoid important habitat as described in the Sierra Nevada Bighorn Sheep Recovery Plan or other guidance from the U.S. Fish and Wildlife Service.

Potential Management Approach

- If reintroduced bighorn sheep establish themselves in drainages outside the reintroduction sites, take advantage of opportunities to extend bighorn sheep range, consistent with other resource activities.

Yosemite Toad

The following plan direction is intended to minimize adverse impacts of grazing activities on suitable breeding and rearing habitat of Yosemite toad, which is a federally listed threatened species. This plan direction intends to prevent livestock from trampling young of year toads and alteration of breeding habitat through the end of the permitted grazing season. Yosemite toad suitable breeding and rearing habitat is defined in the glossary. However, specific breeding and rearing season dates are determined locally. This plan direction will help achieve conditions at the meadow scale that enable attainment and maintenance of desired conditions for Yosemite toad and its habitat.

Desired Conditions (SPEC-YT-DC)

- 01 Livestock use does not alter breeding and rearing habitat within Yosemite toad occupied meadows.
- 02 Yosemite toad occupancy is stable or increasing across the species range and their habitats are supporting reproduction and recruitment.

Standard (SPEC-YT-STD)

- 01 In years with well above average precipitation when Yosemite toad reproduction and recruitment is very high across all population areas, annual operating instructions for grazing may not authorize grazing in occupied meadows throughout the grazing season.

Guidelines (SPEC-YT-GDL)

- 01 Grazing management practices such as deferred seasonal grazing, meadow fencing, and grazing period should be used to keep livestock away from known occupied sites and highly suitable breeding and rearing habitats including breeding pools.
- 02 Livestock grazing should be excluded from areas with standing water and saturated soils in meadows with breeding areas and associated streams and springs occupied by Yosemite toads (through metamorphosis).
- 03 Specific Yosemite toad breeding and rearing season dates should be determined locally.
- 04 Grazing management practices should be used to avoid trampling of young of year toads by livestock and alteration of breeding habitat through the end of the permitted grazing season.

- 05 When utilization and/or disturbance indicators are reached within representative Yosemite toad occupied meadows and breeding habitats; livestock should be removed from the grazing area.

Potential Management Approaches

- Use a probability of occupancy model to assist in assessing Yosemite toad occupancy, distribution, and suitable breeding and rearing habitats. Also use the model to manage livestock use and disturbance within riparian complexes that provide suitable Yosemite toad breeding habitat at representative areas and to establish guidelines at designated monitoring areas.
- Assess meadow habitat conditions using Forest Service proper functioning condition assessment procedures on a rotating basis and as time allows.
- Base alternative use and disturbance indicators and values on best available science and monitoring data and apply to annual operating instructions for grazing.
- Develop conservation options for selected meadows with large source populations of Yosemite toad, where livestock exclusion is practical in providing refuge to the source populations as part of conservation strategy.
- Forest Service biologists will rely on the bioregional monitoring program to assess Yosemite toad occupancy and population trend. At a local scale, a set of representative meadows will be selected to annually monitor habitat and Yosemite toad presence/absence and distribution.
- Using a method to subsample occupied meadows; assess pre-existing ground cover altered levels prior to livestock entry and post-grazing season ground cover altered within 2 weeks of livestock removal to determine the disturbance indicator level on the designated management area attributed to that grazing season.

Bats

Potential Management Approach

- Protect known bat hibernacula or maternity colonies that may be adversely affected by recreational, management, or other activities by either installing bat gates at the entrances of caves and mines or restricting access by other means.

Lahontan Cutthroat Trout

Standards (SPEC-LCT-STD)

- 01 In stream reaches occupied by or identified as essential habitat in the conservation assessment for the Lahontan cutthroat trout, limit streambank disturbance from livestock to 10 percent of the occupied or essential habitat stream reach. Implement corrective action where streambank disturbance limits have been exceeded.

Guidelines (SPEC-LCT-GDL)

- 01 Establish a 200-foot zone on each side of all reaches of the tributaries to Portuguese Creek and Cow Creek where Lahontan cutthroat trout currently occur and on all Class I, II, and III tributaries above those reaches. Apply the following within this zone to avoid adverse effects to the species:
- a. Trees should be felled and yarded away from the stream course;

- b. Slash and other debris should be kept out of stream courses, except for the purpose of fish habitat improvement. Woody debris removed from stream courses will be disposed of by methods that do not adversely affect the species or occupied habitat.

Paiute Cutthroat Trout

Standard (SPEC-PCTR-STD)

- 01 In stream reaches occupied by or identified as essential habitat in the recovery plan for the Paiute cutthroat trout, limit stream bank disturbance from livestock to 10 percent of the occupied or essential habitat stream reach. Take corrective action where stream bank disturbance limits have been exceeded.

Golden Trout

Goal (SPEC-GT-GOAL)

- 01 Continue to coordinate and collaborate with California Department of Fish and Wildlife to implement and renew the California Golden Trout Conservation Assessment and Strategy.

Potential Management Approach

- Continue to implement and update the California Golden Trout Conservation Assessment and Strategy with cooperating agencies.

Invasive Species

Desired conditions and other plan components under this heading address reducing populations of invasive species and minimizing their impacts on native species and ecosystems. Invasive species on the Sierra National Forest comprise all life forms including plants, animals, invertebrates and fungi.

Desired Conditions (INV-FW-DC)

- 01 Terrestrial and aquatic invasive species are controlled or eradicated when possible, and establishment of new populations is prevented.
- 02 The area affected by invasive species and introduction of new invasive species is minimized.

Objective (INV-FW-OBJ)

- 01 Within 15 years of plan approval, take action to control nonnative invasive plant species on at least 300 acres.

Goals (INV-FW-GOAL)

- 01 Coordinate and cooperate with local, State, and Federal agencies and Tribes to manage and control invasive and nonnative species.
- 02 Work with Tribes to determine priority areas for weed prevention and control, especially focused on traditional gathering areas that are threatened by weed infestations. Consult with Tribes before using pesticides or herbicides that may affect traditional gathering.

- 03 Coordinate with research and other organizations to evaluate the potential effects of climate change on the spread of invasive and nonnative species.

Standards (INV-FW-STD)

- 01 When working in waterbodies with known aquatic invasive species, clean equipment and vehicles before moving to other waterbodies.
- 02 Hay, straw, and other crop-related forage or mulch products used for animal feed or bedding, soil stabilization land rehabilitation, or other purposes must be certified by California or Nevada and/or to the North American Invasive Species Management Association standards as being weed-free to prevent unintentional introduction of invasive species (unless in consultation with the Forest Service invasive species coordinator it is determined that certified weed-free material is not reasonably available).
- 03 Use an integrated pest management approach in the planning and implementation of all projects and activities.
- 04 When entering or exiting project sites, wash heavy equipment to prevent the spread of invasive species.

Guidelines (INV-FW-GDL)

- 01 Projects should be designed to minimize invasive species spread by incorporating prevention and control measures into ongoing management or maintenance activities that involve ground disturbance, terrestrial or aquatic habitat alteration, or the possibility of spreading invasive species. When feasible, projects should include measures to use invasive species-free gravel, fill, and topsoil; and include follow-up inspections as needed and specified in regional or national strategies.
- 02 To the extent feasible, plant and seed materials used for revegetation, restoration, and rehabilitation projects should be native, genetically appropriate to the site, disease free, and capable of becoming established to restore natural species composition and ecosystem function.
- 03 Weed control and prevention measures should be included as necessary when issuing, amending or reissuing permits, including but not limited to livestock grazing, special uses, and pack stock operator permits.
- 04 Vegetation management projects on lands outside of wilderness should include measures to minimize the risk of introducing nonnative invasive species into wilderness.

Potential Management Approaches

- Work with Tribes to determine priority areas for weed prevention and control, especially focused on traditional gathering areas that are threatened by weed infestations.
- Coordinate with research and other organizations to evaluate the potential effects of climate change on the spread of invasive, nonnative species.
- Develop a forestwide Invasive Plant Management Strategy that includes:
 - ◆ a treatment prioritization strategy for invasive plant species considering ecological impact, extent and location of populations, and effectiveness of available treatment methods;

- ◆ management objectives for individual species or populations of species; and
- ◆ other approaches such as public education and direct management.
- Focus treatment efforts on high priority invasive species and infestations, while developing management goals for lower priority species and infestations. Prioritize areas such as wilderness, research natural areas, botanical areas, wild and scenic areas, and aquatic and riparian areas to maintain the integrity of native species and ecosystems. Prepare control and prevention plans for high priority invasive species, which promote early detection of new populations and rapid management response as an effective approach to minimize spread.

Fire

This section of the plan begins with general fire management direction that applies forestwide. It is then followed by direction for four different strategic fire management zones that are based on wildfire risk across the Sierra National Forest.

The purpose of strategic fire management zones is to support decisionmaking before a fire ignition occurs, by pre-assessing the risk and benefits from wildland fire (both wildfire and prescribed fire) to areas on the landscape. Forest plan guidance aids wildland fire management decisions to meet the full range of forest plan objectives and use the most appropriate wildfire response within all the zones. Wildfire responses include a spectrum of strategies that include full suppression, confine and contain, monitoring, and management to meet resource objectives. The entire spectrum of strategies is available in all the zones, and all wildland fires will be actively managed using a strategy, or combination of strategies, from this spectrum. The boundaries of the fire management zones are determined by conditions on the ground, and have the potential to be influenced as the result of development or natural disturbances. The zones are mapped based on current conditions and are displayed in appendix A, figure 12. Adjustments to the fire management zone maps may be made with an administrative change to the plan to reflect changes on the ground. Within all zones, active management through fuel reduction treatments such as thinning and prescribed fire reduces fuels and fire hazard while mitigating safety hazards for firefighters within all zones.

Forestwide Components for Fire

Desired Conditions (FIRE-FW-DC)

- 01 Fire management activities minimize the risk of loss of life and damage to property or ecosystem function. Firefighter and public safety is the first priority in every fire management activity.
- 02 Fire management activities reduce fuel buildup, help maintain and protect habitat for a variety of species, reduce smoke from larger fires, provide added protection for communities, and restore fire on the landscape. These actions are also an integral part of achieving sustainable recreation, particularly by maintaining scenic attractiveness, integrity, and character.
- 03 Fire management uses an all-lands, risk-based approach in planning and decisionmaking, responsive to the latest fire and social sciences, and adaptable to rapidly changing conditions, including climate change. Wildfire management is coordinated with agencies and partners.

- 04 Wildland fires burn with a range of intensity, severity and frequency that allow ecosystems to function in a healthy and sustainable manner. Wildland fire is understood as a necessary process, integral to the sustainability of fire-adapted ecosystems and is used as an effective restoration tool (see TERR-FW-DC related to fire). The landscape is strategically compartmentalized by treated areas and natural features, which facilitates use of prescribed fire and wildfire to meet resource objectives for protecting values and resources.
- 05 The Sierra National Forest staff contributes to increased awareness and understanding about wildfire risk among community leaders, service providers, homeowners, permittees, and Tribes who are invested in or adjacent to the national forest. This includes an understanding about the need to adapt communities, properties, and structures to wildfire while also recognizing that wildland fire is a needed ecological process.
- 06 Wildfire threat is reduced in areas where fuel conditions currently pose the highest threat to communities and community assets, such as powerlines, communication towers and developed recreation sites.
- 07 Education and enforcement have reduced the likelihood of wildfire starts from people.

Goals (FIRE-FW-GOAL)

- 01 Coordinate wildfire management with relevant State agencies, adjacent Federal agencies, and other partners, and include consideration of the net gains to the public.
- 02 Work with partners to plan restoration and fire management projects for large landscapes (subwatershed or larger) when and where possible to improve economic feasibility of restoration and effectiveness of changing the negative fire effects from large wildfires.
- 03 When wildfires affect identified areas of Tribal importance or cultural sites, communicate and collaborate with Tribal leadership during fire incident management to identify Tribal values or areas of Tribal importance.
- 04 Restore ecosystems to a more fire-resilient condition and lessen the threat of wildfire to communities.
- 05 Coordinate with other jurisdictions such as communities, Tribes, service providers, and Federal, State, county, and local entities regarding prevention, preparedness, planned activities, and responses to wildland fires. Notify those agencies about upcoming and ongoing fire season and any prescribed fire activity.
- 06 Help communities become more fire adapted and to improve their ability to withstand a fire without loss of life and property.
- 07 Work with partners and adjacent landowners to provide defensible space as defined by California Public Resource Code 4291.
- 08 When wildfires affect identified areas of Tribal importance, communicate and collaborate with Tribal leadership during fire incident management to identify and, to the extent practical, protect Tribal values and minimize impacts to resources or areas of Tribal importance.

Standards (FIRE-FW-STD)

- 01 Fire management actions within research natural areas must be planned and carried out in consultation with the national forest research natural area coordinator and the fire resource advisor. Fire management actions in giant sequoia groves should be carried out in consultation with the fire resource advisor.
- 02 If fire management actions are required within designated wilderness areas, research natural areas, botanical areas, giant sequoia groves, or the Pacific Crest National Scenic Trail management area:
 - Apply minimum impact strategies and tactics to manage wildland fire, unless more direct attack is needed to protect people or adjacent property.
 - When possible, allow naturally ignited wildfires to function in their natural role.

In cases where fire may damage the ecological values for which a research natural area was established, measures should be taken to exclude fire from the research natural area.

Guidelines (FIRE-FW-GDL)

- 01 Use naturally ignited and prescribed wildland fires to meet multiple resource management objectives where and when conditions permit, and risk is within acceptable limits.
- 02 When managing wildland fire (wildfire and prescribed fire), use a variety of fire management options, including hand and aerial ignitions, to achieve a mix of fire effects. When safe and feasible, limit extensive continuous areas of high-severity fire effects in old forest habitat.
- 03 When managing wildland fire, allow fire to burn in riparian ecosystems when fire effects are expected to be within the natural range for the ecosystem to improve riparian ecosystem function.
- 04 Where possible during wildland fire management activities, locate incident bases, camps, helibases, staging areas, helispots and other centers for incident activities outside of riparian conservation areas to avoid impacts to aquatic- and riparian-dependent resources.
- 05 During wildfires, avoid fire management activities in special habitats (see Terrestrial section, chapter 2) except when necessary to protect life and property. This includes activities such as line construction, staging areas, safety zones, water drafting, and camps. When fire management activities near special habitats are necessary, take extra measures to avoid spread of invasive plants.
- 06 When conducting fire management activities, take appropriate measures to prevent the spread of invasive species.
- 07 When safe and feasible, protect highly valued old den and nest trees ahead of burn operations using techniques such as targeted burning, removing fuel from the base of trees, and providing direct protection.

Potential Management Approaches

- When determining the appropriate wildfire management strategy, use spatial support tools such as wildfire risk assessments, fire management operating plans, and the current Forest Service decision support system for wildfire management. Locations of special

habitats, old forest patches, and key habitat areas for at-risk species should be readily available in the current Forest Service decision support system for wildfire management ahead of fire season.

- Prior to and during the fire season, assess conditional thresholds under which desired conditions can be met for the strategic fire management zones. Work with Tribes and adjacent landowners to identify areas and resources of value considered in the assessments.
- Assess human-caused ignitions and implement prevention activities that reduce the likelihood of the most common human-caused ignition sources.
- Work with adjacent land management agencies and other landowners to treat fuels, to reduce costs and increase effectiveness in restoring fire to the landscape.
- Prioritize fuel treatments in areas that pose the greatest threat to communities and highly valued resources. Integrate terrestrial ecosystem desired conditions into spatial patterns for fuel reduction treatments. Incorporate heterogeneity by increasing variation in tree spacing, enhancing tree clumps, creating canopy gaps, promoting fire-resilient tree species, increasing the ratio of large to small trees, and using topographic variation (such as slope, aspect, and position) to guide treatment prescriptions.
- Where feasible and suitable, consider all available tools and methods to reduce vegetation buildup to lower the risk of unwanted wildfire, including grazing, mechanical treatment, prescribed fire, or wildfires managed to meet resource objectives.
- Areas that historically supported more frequent fire, like ponderosa pine and Jeffrey pine-dominated forests, and areas with high existing levels of understory fuels are prioritized for treatment.

Strategic Fire Management Zones

Community Wildfire Protection Zone

The community wildfire protection zone encompasses locations where communities, community assets, and private land could be at a very high risk of damage from wildfire where high fuel loadings exist. Wildfires that start in this zone contribute more to potential loss of community assets than any other strategic fire management zone.

Within this zone, community buffer areas are identified and used to strategically reduce or thin vegetation directly adjacent to structures and provide safer conditions for firefighters. Community buffer widths are measured from the structures in the community (see glossary). Maximum width of the buffer is based on potential fire behavior in nearby areas under extreme fire weather conditions. The maximum width is sufficient to provide low radiant heat from areas of untreated fuels.

Although some wildfires that burn in this zone can potentially benefit natural resources and help decrease fuels and threats from future wildfires, these potential benefits are less likely under most weather, fuel moisture, and other environmental conditions due to the very high risk to community assets during the fire season. The long-term focus is to create fire-adapted communities that are less reliant on aggressive wildfire protection. Under most weather and fuel conditions, wildfire mitigation, fuel reduction treatments, and fire protection is needed in the community wildfire protection zone to prevent direct threats to life or property. Wildfire is

suppressed under most weather and fuel conditions due to the very significant risk of potential economic loss and public safety concerns posed by a wildfire occurring within this zone.

Because the community wildfire protection zone is centered on places where fire ignitions have a high probability of negatively impacting community assets, it is expected to remain generally fixed for the plan period, but may be adjusted locally for new infrastructure developments and local circumstances.

Desired Conditions (FIRE-CWPZ-DC)

- 01 Areas adjacent to communities with current high fire risk have low fuel loadings, designed to result in less intense fire behavior and to facilitate safe wildland fire operations. In some cases, terrestrial ecosystem desired conditions may not be met.
- 02 Over time, risk to communities is reduced sufficiently in the community wildfire protection zone to allow some areas to be placed in a lower risk zone, including the general wildfire protection or wildfire restoration zones.

Goal (FIRE-CWPZ-GOAL)

- 01 Protect communities (life and property) from the negative impacts of wildfire.
- 02 Reduce the impacts of wildfire by creating fire-adapted communities through fuel reduction treatments, prescribed fire, and managing wildfires that can benefit natural resources while reducing risk.

Standards (FIRE-CWPZ-STD)

- 01 In community buffer areas, fuels treatments take precedent over riparian conservation area guidelines when necessary to meet fire behavior objectives. On a site-specific basis, higher levels of large logs may be retained in some areas.⁸

Guidelines (FIRE-CWPZ-GDL)

- 01 When planning and implementing projects around communities, manage vegetation in community buffer areas to meet the following conditions:
 - a. Reduce fuel loads to provide a safe place to deploy needed resources to protect structures and allow for firefighter safety during a fire event. After treatment, these areas may not meet stand structure or densities terrestrial vegetation desired conditions.
 - b. Minimize snag and log densities to reduce the likelihood of spotting or ember ignitions, maximize fireline production rates, and reduce firefighter safety hazards.
 - No snags should exist within 2.5 tree lengths distance from structures.
 - Less than 1 large log per acre should exist within 2.5 tree lengths of structures.
- 02 To protect communities, locate fuels treatments in areas that pose the greatest fire threat.

⁸ Measured from the structures in the community. Maximum width is based on potential fire behavior in adjacent areas under extreme fire weather conditions (i.e., 97th percentile weather, probable average momentary wind gusts). The maximum width is sufficient to provide low radiant heat from areas of untreated fuels (i.e., four times the potential maximum flame length in adjacent areas on slopes less than 40 percent and six times the potential maximum flame length in adjacent areas on slopes greater than 40 percent).

- Ensure sufficient treatments increase and improve tactical opportunities to manage wildfires and reduce the spread rate and intensity of wildfires.
- Consider placing treatments along ridges, roads, or other natural or man-made lines.

General Wildfire Protection Zone

The general wildfire protection zone identifies where conditions currently put some natural resource and/or community values at high risk of damage from wildfire. In some areas, wildfires in the general wildfire protection zone may have negative effects on natural resources due to the natural fire regime and condition of the ecosystem. Wildfires that start in the general wildfire protection zone in some areas can contribute to the high fire risk in the community wildfire protection zone.

Managing wildfires to meet resource objectives in this zone is often considerably constrained due to fuel conditions, the high risk of loss of natural resources, and the potential adverse impacts to communities threatened by wildfires starting in this zone. Although some wildfires that burn in this zone can potentially benefit some natural resources, negative impacts to many natural resources are more likely under most weather, fuel moisture, and other environmental conditions during the fire season. Targeted ecological restoration and hazardous fuel reduction are needed in the general wildfire protection zone to safeguard communities and resources.

The risks within the general wildfire protection zone are expected to change over time as fuel and vegetation conditions move towards desired conditions and risks shift to a lower risk class (toward the wildfire maintenance zone).

Desired Conditions (FIRE-GWPZ-DC)

- 01 The threat to communities from wildfires starting in this zone is minimal due to vegetation conditions reaching a balance of reduced excessive fuel loading while maintaining terrestrial ecosystem desired conditions.
- 02 The landscape is resilient and can tolerate varying effects of wildfires. Over time, risk to values is reduced sufficiently in the general wildfire protection zone to allow some areas to be placed in a lower risk zone including the wildfire restoration and wildfire protection zones.

Goals (FIRE-GWPZ-GOAL)

- 01 Protect natural resources from the negative impacts of wildfire and prevent direct threats to life or property in nearby communities.
- 02 Reduce the threat of wildfire spreading to communities through fuel reduction treatments, prescribed fire, wildfires managed to meet resource objectives, and when appropriate and feasible, livestock grazing, while also reducing risk to natural resources.

Guidelines (FIRE- GWPZ-GDL)

- 01 To reduce the spread rate and intensity of wildfires, locate restoration treatments in areas that pose the greatest fire threat to communities and natural resources and use more tactical opportunity areas like along ridges, roads, and other natural or man-made features.

Wildfire Restoration Zone

The wildfire restoration zone identifies where conditions currently put some natural resource values at moderate risk of damage from wildfire. In general, wildfires that start in this zone pose a low to moderate threat to communities in average fire season conditions.

Wildfires that burn in this zone can potentially benefit natural resources, but only under limited environmental conditions. Managing wildfires to meet resource objectives in this zone may be constrained due to fuel conditions and moderate risk to natural resources. Ecological restoration may be needed before using wildland fire under a wider range of weather, fuel moisture, and other environmental conditions.

The risks within the wildfire restoration zone are expected to change over time as fuel and vegetation conditions move towards desired conditions and risks shift to a lower risk class (toward the wildfire maintenance zone).

Desired Conditions (FIRE-WRZ-DC)

- 01 The landscape is resilient to a range of fire effects, and wildland fire has a predominately positive benefit to ecosystems and resources.
- 02 Wildfire is managed to meet resource objectives under a wide range of environmental conditions.
- 03 The landscape is resilient to the impacts of wildfire. Over time, risk to natural resources is reduced sufficiently in the wildfire restoration zone to allow some areas to be categorized in the wildfire maintenance zone.

Standard (FIRE-WRZ-STD)

- 01 Use natural barriers and features like creeks, old fire footprints, ridges and man-made lines such as roads and trails when managing wildfires to meet resource objectives, unless unsafe or impractical.

Wildfire Maintenance Zone

The wildfire maintenance zone encompasses areas where wildfire poses a low threat to communities in average fire season conditions and where conditions allow natural resources to benefit from wildland fire.

Managing wildfire to meet resource objectives in this zone is the least constrained. Ecological maintenance can be carried out by the management of wildland fire under a wide range of weather, fuel moisture, and other environmental conditions. Conditions in this zone are favorable to implementing prescribed fire for ecological restoration, and to meet resource objectives.

Desired Conditions (FIRE-WMZ-DC)

- 01 Ecosystems are resilient to the impacts of wildfire, and wildland fire has predominantly positive benefits to ecosystems and resources.
- 02 Lands within this zone are maintained in a predominately low risk with high potential benefit condition relative to wildland fire.

Standards (FIRE-WMZ-STD)

- 01 Following current wildland fire policy, manage wildfires to meet resource objectives and restore and maintain fire as an ecological process. The responsible line officer must use the current decision support system for wildfire management to document cases when naturally caused wildfires are promptly suppressed.
- 02 Use natural barriers and features, such as creeks, old fire footprints, ridges, and man-made lines such as roads and trails when managing wildfires to meet resource objectives, unless unsafe or impractical.

Social and Economic Sustainability and Multiple Uses

The following topics are grouped under this heading:

- Sustainable Recreation
- Scenery
- Timber and Other Forest Products
- Rangeland Livestock Grazing
- Geology and Minerals
- Energy
- Cultural Resources
- Tribal Relations and Uses
- Local Communities
- Volunteers, Interpretation, Partnerships and Stewardship
- Lands
- Infrastructure

Sustainable Recreation

The Sierra National Forest receives nearly 1.5 million annual visits by local and state residents and by people from all over the world. The Sierra National Forest seeks to provide a quality, sustainable recreation program by assessing recreation settings, opportunities, access and scenic character (addressed in the next section). The Sierra staff uses various tools to describe and assess these categories.

A niche statement is what the Sierra National Forest uses to describe what it has to offer in terms of special places, opportunities and potential experiences, overlapped with what people desire and expect in terms of outdoor recreation from public lands. The Sierra's niche is described as follows:

From lakeside camping and picnicking to wilderness solitude, the Sierra National Forest is destination recreation. With intensely used and highly developed lakes and the world famous Ansel Adams and John Muir Wildernesses the Sierra provides the extreme ends of recreation settings. These sharp contrasts provide destinations for visitors to escape from the intensity of urban life, connect with nature, family and friends. Given the proximity to large, diverse and growing urban areas the Forest has a responsibility to provide heritage and conservation education to sustain this incredible landscape for future generations.

The Sierra staff manages for outdoor recreation activities that are consistent with these settings and recreation opportunities. The Sierra developed a recreation opportunity spectrum, or framework, to define and categorize recreation settings into six distinct opportunity classes: primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural and

urban. A map of Sierra's recreation opportunity spectrum classes is provided in figure 22, in appendix A.

Desired conditions and other plan components under the sustainable recreation heading apply to forestwide recreation settings and accompanying recreation opportunities. The Sierra National Forest has also described place-based management areas that provide a contiguous backdrop for particular opportunities and activities. Plan components specific to these place-based areas are in chapter 3, under "Management Areas," subsection "Sustainable Recreation."

Desired Conditions (REC-FW-DC)

- 01 The diverse landscapes offer a variety of recreation settings for a broad range of year-round, nature-based recreation opportunities. Management focuses on settings that enhance the national forest recreation program niche.
- 02 The design, condition, function, and accessibility of recreation facilities accommodate diverse cultures.
- 03 Recreation opportunities provide a high level of visitor satisfaction. The range of recreation activities contribute to social and economic sustainability of local communities.
- 04 Recreation opportunities are balanced with management capacity to manage sites to agency standards.
- 05 Areas of the national forest provide for a variety of activities with minimal impact on sensitive environments and resources.
- 06 Visitors can connect with nature, culture, and history through a range of sustainable outdoor recreation opportunities, and are committed to resource stewardship.
- 07 The management and operation of facilities are place based, integrated with other resources, and responsive to changing environmental, social, and economic conditions that may limit or alter access.
- 08 New developed recreation infrastructure is located in ecologically resilient landscapes, is economically sustainable, and responsive to public needs.
- 09 Dispersed recreation occurs in areas outside of high visitation, developed facilities, or communities, and does not adversely impact natural or cultural resources.
- 10 Permitted recreation uses, such as recreation special events or guided activities, are consistent with recreation settings, protect natural and cultural resources, and contribute to the economic sustainability of local communities.
- 11 Recreation information is current, connecting people to the national forest through contemporary means including social media and available technology. Diverse communities are aware of recreation opportunities on the national forest.
- 12 The national forest provides a range of year-round developed and dispersed recreation settings that offer a variety of motorized and nonmotorized opportunities and recreation experiences that provide satisfying experiences for the variety of visitor preferences. The location and distribution of desired recreation settings is displayed in figure 22, appendix A.

- 13 A sustainable system of trails provides access to destinations, provides for opportunities that connect to a larger trail system, provides linkages from local communities to the national forest, and is planned, designed and managed to be compatible with other resources.
- 14 Trails meet trail management objectives based on trail class and designed use.

Objective (REC-FW-OBJ)

- 01 Within 15 years of plan approval, maintain to standard 25 percent of the Sierra National Forest's designated trail systems.

Goals (REC-FW-GOAL)

- 01 Coordinate with local and national partners early in project development to elicit collaborative input on sustainable recreation opportunities, needs, and potential conflicts.
- 02 Manage dispersed recreation activities when evidence of impacts to natural resources emerge or are causing damage.
- 03 Consider summer transportation systems to connect people to nature, improve personal health, and increase access for underserved communities, minorities, and urban youth.
- 04 Promote effective communication with gateway communities to help foster partnerships, inspire volunteers, educate the public, and support stewardship that contributes to funding, implementation of projects, and long-term maintenance of facilities.
- 05 Improve facilities through individual and community stewardship.
- 06 Collaborate with a variety of partners to provide stewardship and interpretive services that enhance responsible recreation and increase knowledge of related socioeconomic and environmental issues.
- 07 Enhance stewardship and monitoring through increased volunteer program activities and partner contributions.
- 08 Provide accessible trails for individuals with mobility impairments.
- 09 Manage infrastructure to meet the minimum needs of the associated use and the annual maintenance capabilities of the national forest.

Standard (REC-FW-STD)

- 01 The recreation opportunity spectrum will be used for decisions on facility and infrastructure design and development.

Guidelines (REC-FW-GDL)

- 01 When locating new recreation facilities, do not adversely affect environmentally and culturally sensitive areas, such as at-risk species breeding habitat or at-risk plant species habitat.
- 02 Create infrastructure that mimics the natural textures and colors of the surrounding landscape to be consistent with the recreation setting.

- 03 Use integrated resource planning when designing projects to address impacts to culturally sensitive areas and at-risk species habitat, and to address changing conditions in recreation settings.

Potential Management Approaches

- Use current and effective public education tools to increase visitor responsibility and promote sustainable recreation use.
- Use management methods, such as seasonal road or trail closures, when appropriate to manage and protect resources and infrastructure.
- Consider improving recreation opportunities at existing facilities prior to developing new ones.
- Use informational signs to inform the public on trail etiquette, wildlife awareness, and other responsible behaviors.
- Conduct motorized recreation activity planning where and when needed, looking for opportunities to connect loops and complete routes in areas with high visitation.
- Focus the program of work on maintaining existing opportunities to protect natural resources, and provide a satisfying visitor experience.
- Use available technology, interpretive messages and interactions, and partnerships to educate national forest users and develop sustainable trail system and recreation opportunities that are focused on the long-term sustainability of the land, animals, fish, and plant species that support a healthy forest ecosystem.
- Visitors camping outside of developed site will be introduced to “leave no trace” principles and will be responsible for appropriate disposal of all waste products so that no dumpsters or portable toilets will be provided by the agency.
- Use available technology, interpretive messages and interactions, and partnerships to educate national forest users and develop sustainable recreation opportunities that are focused on the long-term sustainability of the land, animals, fish, and plant species that support a healthy forest ecosystem.
- Develop a clear vision for partnership engagement.
- Use trailhead and camp hosts or volunteer patrollers to educate and interact with the public to promote responsible and sustainable public use practices.
- Redesign, restore, or rehabilitate recreation sites where recreation activities have caused unacceptable natural or cultural resource damage.

Scenery

Desired conditions and other plan components under this heading apply to the Sierra’s management of scenery. Ecosystems provide the environmental context for a scenery management system; a framework that considers scenic character and aesthetic values, geologic features and viewsheds. Scenic character is a combination of the physical, biological, and cultural images that gives an area its scenic identity and contributes to its sense of place. Scenic character provides a frame of reference from which to determine scenic attractiveness and to measure scenic integrity.

Providing a high level of scenic integrity may have to be achieved through establishing an “ecological aesthetic” over time through knowledge and appreciation of how a healthy ecosystem functions. In some situations, preferred scenic conditions, such as absence of down woody debris from timber harvest, may run counter to the need for woody debris to provide wildlife food and cover, nutrient recycling, or other needs.

Desired Conditions (SCEN-FW-DC)

- 01 The Sierra National Forest provides a variety of ecologically sound, resilient, and visually appealing forest landscapes that sustain scenic character, supporting the national forest recreation program niche in ways that contribute to visitors’ sense of place and connection with nature.
- 02 Scenic character is maintained or adapted to changing conditions to support ecological, social, and economic sustainability on the Sierra National Forest and in surrounding communities.
- 03 Scenic integrity is maintained in places people visit for high quality viewing experiences.
- 04 Scenic resources complement the recreation settings and experiences, as described by the range of scenery integrity objectives, while reflecting healthy and sustainable ecosystem conditions. The desired distribution of scenic integrity objectives is displayed in figure 23, appendix A.
- 05 The built environment meets or exceeds scenic integrity objectives and contributes to scenic stability.
- 06 Scenery stability is enhanced through integrated fuels and forest health projects.

Goal (SCEN-FW-GOAL)

- 01 The Forest Service works with other agencies and adjacent landowners to maintain shared vistas.

Guidelines (SCEN-FW-GDL)

- 01 Management activities should maintain or move toward scenic integrity objectives in the long-term timeframes.
- 02 In order to meet scenic integrity objectives, consider improving scenery resources during vegetation treatment and fuels reduction projects.
- 03 When practical, design management activities to meet and exceed the specified scenic integrity objective.

Potential Management Approaches

- Use integrated resource planning during projects to respond to changing scenery conditions affecting scenic character and integrity.
- Minimize visible lines in landscape areas where vegetation is removed for management objectives. Cleared areas should include edges that reflect the visual character of naturally occurring vegetation openings

Timber

Desired conditions and other plan components under this heading cover timber management. Forest management on the Sierra National Forest consists of restoration and fuels reduction treatments designed to achieve desired conditions for the associated terrestrial vegetation type on suitable timber lands (appendix E). The 1.3 million acres of the Sierra National Forest includes approximately 141,626 acres that are suitable for timber production (figure 24). Land determined to be suitable is land where timber production is the primary or secondary management objective. On lands not suited for timber production, timber harvest may occur to protect multiple use values other than timber production, and for salvage, sanitation, or public health.

Desired Conditions (TIMB-FW-DC)

- 01 Predictable and sustainable forest product yields contribute to maintaining and improving local and regional industry infrastructure and workforce and are sufficient to meet the needs of the desired pace and scale of ecological restoration over the next several decades.
- 02 Production of timber contributes to ecological, social, and economic sustainability and associated desired conditions. A sustainable mix of forest products (including both sawtimber and non-sawtimber) is offered under a variety of harvest and contract methods in response to market demand and restoration needs.
- 03 Salvage, including sanitation cutting of dead and dying trees, captures as much of the economic value and carbon storage capacity of the wood as possible while retaining key features in quantities that provide for wildlife habitat, soil productivity and ecosystem functions, consistent with restoring the landscape towards desired conditions.

Objective (TIMB-FW-OBJ)

- 01 Provide approximately 20 to 40 million cubic feet (MMCF) per decade to contribute to the local forest products infrastructure (see appendix E, timber suitability and management).

Goals (TIMB-FW-GOAL)

- 01 After disturbances occur on lands identified as suitable for timber production, where consistent with terrestrial vegetation desired conditions, and when funding is available, adequately restock these areas within 5 years of salvage harvest, if applicable, or, when salvage harvest is not used, within 5 years of site preparation.
- 02 As resources and partner support are available, conduct reforestation on up to an average of 3,500 acres per year where needed to achieve desired conditions based on natural range of variation, and considering changing environmental conditions.

Standards (TIMB-FW-STD)

- 01 Following regulated regeneration harvest (such as group selection) on lands identified as suitable for timber production, create and maintain planting environments that favor seedling survival and rapid growth rates. Facilitate early and periodic use of fire to reduce future wildfire-related mortality, and provide sufficient tree numbers to meet future vegetation desired conditions that support a variety of ecosystem services and resilience, including forest products, wildlife habitat and carbon storage. A site-specific silvicultural

prescription will be designed to ensure that lands are adequately restocked within 5 years of a regeneration harvest (see appendix E for stocking criteria).

- 02 When conducting reforestation in response to wildfire, windthrow, insects, pathogens, or other stand-replacing disturbances, create and maintain planting environments that favor seedling survival and growth, facilitate early and periodic use of fire to reduce future wildfire-related mortality, and provide sufficient tree numbers to meet future vegetation desired conditions, considering future changes in climate, to provide a variety of ecosystem services including forest products and carbon storage.

Guidelines (TIMB-FW-GDL)

- 01 Discourage the retention of snags within and immediately adjacent to areas planned for reforestation to mitigate hazards to workers. High fuel levels should not be retained in plantations that would preclude the use of prescribed burning at appropriate times as the plantation matures.
- 02 Reforestation of suitable lands should be designed to achieve stocking levels, spatial arrangements and species composition to facilitate future vegetation desired conditions that allow for long-term resilience of the developing forest, while considering potential future plantation management, carbon carrying capacity, wildlife habitat and climate change adaptation. Competing vegetation, fuel levels, and fire risk should be managed to provide for the long-term survival and vigor of reestablishing forests as they move toward maturity.
- 03 On lands not suited for timber production, reforestation of deforested lands should contribute to ecological restoration of desired vegetation conditions, to provide benefits such as improved scenic character, wildlife habitat, carbon storage, and watershed condition.

Potential Management Approaches

- Encourage use of small trees and wood biomass to support a variety of potential uses.
- Develop landscape scale projects to increase the pace and scale of ecological restoration, ecosystem resilience, and to protect the carbon carrying capacity of the forest.
- Plan vegetation, fuels, and other restoration projects across large landscape areas (greater than 5,000 to 10,000 acres), when it can increase efficiency in planning and support partnership-based approaches, such as stewardship contracts or facilitating grant applications to augment funding or capability.
- Look for partnership and grant opportunities to increase capacity for reforestation as a component of moving vegetation towards desired conditions following large-scale disturbances.

Range

Desired conditions and other plan components under this heading apply to rangeland management, which includes the authorized use and management of National Forest System lands for the purpose of livestock production and utilization of forage resources by livestock.

Desired Conditions (RANG-FW-DC)

- 01 Rangelands, along with grazable forestlands and woodlands, provide large areas of contiguous space supporting native and desired nonnative vegetation that has the potential to be grazed. These ranges sustain biological diversity and ecological processes and help to preserve the rural landscape and cultural heritage of the central, southern and eastern Sierra Nevada.
- 02 Livestock grazing is managed to meet or move towards the desired vegetation condition represented by diverse plant functional groups, species richness and diversity, and structure and condition of plant communities.
- 03 Rangelands are managed to maintain or restore hydrologic function and soil productivity of watersheds. Livestock grazing is managed to accommodate the maintenance or restoration of aquatic and riparian processes and functions.
- 04 Rangelands are in satisfactory condition and allotments have management strategies that achieve or maintain rangeland conditions in satisfactory condition.
- 05 Annual grasslands that are grazed have livestock management strategies that encourage retention and recruitment of native plants, encourage retention of desirable exotic plants, and discourage or suppress undesirable and invasive exotic plants. These livestock management strategies are adaptable to rapidly changing conditions in forage quality or production.

Goals (RANG-FW-GOAL)

- 01 Work with stakeholders ensures livestock grazing management strategies in oak woodland, aspen, and woody riparian areas encourage regeneration of hardwood and riparian woody vegetation.
- 02 Work with stakeholders ensures livestock grazing management strategies minimize negative effects to the structure and function of vegetation and aquatic and riparian ecosystems, especially for small-scale special aquatic features such as fens and springs, as well as habitat and refugia for at-risk species.
- 03 Work with stakeholders ensures livestock grazing management strategies are adaptable to changes in available forage due to wildfire or drought, and to post-fire transitory range.

Standards (RANG-FW-STD)

- 01 Manage livestock grazing to attain desired conditions in blue oak-interior live oak woodlands, annual grasslands, aspen, special habitats, great gray owl protected activity areas, occupied willow flycatcher habitat, and riparian conservation areas. Where livestock grazing is found to prevent or retard attainment of desired conditions, modify grazing practices (such as number of livestock, timing, scheduled rest, and range structures). If adjusting practices is not effective, remove livestock from the area using appropriate administrative authorities and procedures.
- 02 During allotment management planning, livestock handling facilities, stock driveways in riparian areas will be placed to meet riparian conservation area, watershed or water quality standards and guidelines.
- 03 Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are at a

minimum proper functioning condition or functioning at-risk with an upward trend, as defined in the appropriate technical reports.

- 04 If meadow ecological status is determined to be moving in a downward trend due to grazing, modify or suspend grazing. Management of meadows that are in low ecological status or not in proper functioning condition and have active erosion will be modified to achieve or show substantial progress toward meeting mid- or late-seral status and proper functioning condition within 5 years.

Guidelines (RANG-FW-GDL)

- 01 Where annual grasslands have an annual precipitation greater than 10 inches, manage for a minimum residual dry matter of 700 pounds per acre and an average of 60 percent ground cover at the end of the grazing season. Where annual grasslands have an annual precipitation of less than 10 inches manage for 400 pounds residual dry matter per acre. Adjust these guidelines as needed based on grassland condition, and other vegetation or fuels management objectives.
- 02 Burned areas should be evaluated to determine if rest from livestock grazing is necessary for recovery of desired vegetation conditions and related biophysical resources.
- 03 In terrestrial upland vegetation types having good to excellent vegetation and soils conditions, limit grazing utilization to 45 percent use by weight on herbaceous perennial plants and an average of 20 percent use of annual leader growth on other woody shrubs. Browse use may vary across the landscape to accommodate land use objectives such as maintenance of open areas for reduced fuels or public access. Reduce utilization levels by 10 percent or more on sites trending downward in condition or with fair vegetation and soil conditions.
- 04 To protect oak regeneration in grazing allotments, allow livestock browsing on no more than 20 to 30 percent of annual growth of oak seedlings and advanced regeneration. Modify grazing plans if desired recruitment needs for hardwood trees are not being met.
- 05 To manage for multi-aged stands of aspen, limit browsing on no more than 20 to 25 percent of annual terminal leader growth of aspen seedlings, young trees and advanced regeneration. Modify grazing plans if hardwood regeneration and recruitment needs are not being met.
- 06 Limit use of willows and other woody riparian species to no more than 20 to 30 percent of current year's leader growth along streambanks and, as needed, other critical portions of the riparian conservation area. Remove livestock from the area when these utilization indicators are reached or exceeded.
- 07 When grazing in riparian conservation areas under season-long use:
 - For meadows and riparian areas that are functioning at-risk with a downward trend and/or are in low to mid-seral condition with a downward trend, limit livestock utilization of deep-rooted herbaceous plants to 30 to 35 percent. For stream channels and drainways, maintain a minimum 6-inch residual stubble height on the greenline.
 - For meadows and riparian areas that are properly functioning or functioning at-risk with an upward trend and/or are in mid-seral or better condition with a stable to upward trend, limit livestock utilization of deep-rooted herbaceous plants to 40 to 45

percent. For stream channels and drainways, maintain a minimum 4-inch residual stubble height on the greenline.

- For riparian management areas in low elevation, blue oak-interior live oak terrestrial ecosystems limit livestock utilization of deep-rooted herbaceous plants to 45 to 50 percent.
- 08 When grazing under intensive grazing systems where riparian conservation areas receive scheduled rest (such as rest-rotation or deferred rotation), utilization levels may be higher than the levels described under season-long use if the meadow and/or riparian area is maintaining mid- to late-seral ecological conditions and meadow associated wildlife are not being adversely impacted.
 - 09 Move or remove livestock in riparian conservation areas that are not properly functioning or functioning at-risk with a downward trend. Limit annual disturbance to streambanks and shorelines of natural lakes and ponds, when livestock trampling and trailing exceeds 20 percent of stream reach, or natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots.
 - 10 Where professional judgment and quantifiable measurements find that current practices are maintaining range in good to excellent condition, the grazing utilization and/or disturbance indicators may be modified to allow for the Forest Service, in partnership with individual permittees, to evaluate alternative timing or methods of evaluation.
 - 11 Select a minimum of one designated monitoring area for each subunit or pasture within an allotment that serves as the basis for establishing standards and guidelines across the entire subunit or pasture. At a minimum, these designated areas should include an apparent trend rating of vegetation, condition rating of soils, and a photo record.
 - 12 To minimize adverse impacts of grazing activities on the Yosemite toad suitable breeding and rearing habitat, indicators will be used to evaluate when grazing management practices will need to be revised to meet desired conditions for the toad. The indicators and indicator values shown in the table below should be applied on a rotating basis or when seasonal monitoring or other monitoring indicate concerns for occupied habitat (see table 8, next page).

Potential Management Approaches

- Coordinate utilization studies with livestock operators, other appropriate State and Federal agencies and interested people or groups. Utilization studies should be planned and implemented on an interdisciplinary basis.
- Collaborate with permittees, tribes, educational institutions, other agencies, and stakeholders in achieving and maintaining desired conditions, including invasive species management.
- Measures such as salting, herding, water development, fencing and riding will be addressed in annual operating instructions, allotment management plans, permits and permit modifications to improve livestock distribution and minimize impacts to riparian and other sensitive areas. If condition and trend monitoring data, collected every 3 to 5 years, indicates that desired conditions and other plan components are not being achieved, modify or suspend grazing in the affected area.

Table 8. Yosemite toad probability of occupancy or reproduction and rangeland management practices

Proper Functioning Condition of Meadow Habitats	Known Occupied Meadows and/or Highly Suitable Breeding and Rearing Habitats (Utilization)	Known Occupied Meadows and/or Highly Suitable Breeding and Rearing Habitats (Disturbance)	Moderately Suitable Breeding and Rearing Habitats (Utilization)	Low Suitability Breeding and Rearing Habitats (Disturbance)
Properly Functioning	Utilize no more than 35% of herbaceous vegetation.	Alter breeding habitat no more than 20%	Utilize no more than 30% of herbaceous vegetation.	Utilize no more than 40% of herbaceous vegetation.
Functional at Risk with Upward, Static or Unapparent Trend	Utilize no more than 20 % of herbaceous vegetation.	Alter breeding habitat no more than 10%.	Utilize no more than 30% of herbaceous vegetation.	Utilize no more than 30% of herbaceous vegetation.
Functional at Risk and Trending Downward or Non-Functional	Utilize no more than 0-15% of herbaceous vegetation.	Do not alter breeding habitat	Utilize no more than 15% of herbaceous vegetation.	Utilize no more than 15% of herbaceous vegetation.

Tribal Relations and Uses

Desired conditions and other plan components under this heading apply to the Sierra National Forest’s recognition that lands and people surrounding the national forest have an important influence on forest management. The Sierra National Forest lies in the traditional territories of five federally recognized tribes, as well as four unacknowledged tribes, tribal groups and organizations. Tribal communities are contacted and consulted, and are important partners in forest management activities.

Desired Conditions (TRIB-FW-DC)

- 01 The Sierra National Forest staff recognizes Native American needs and viewpoints and fosters a robust relationship with federally and non-federally recognized tribes and related groups with which it consults. National forest personnel, including but not limited to line officers, departmental staff, archaeologists, historians, and tribal liaisons, consult and communicate with tribal leadership, tribal historic preservation officers, traditional religious practitioners, traditional gatherers, tribal members and other tribal organizations.
- 02 The Sierra staff coordinates with Tribes in managing traditional cultural properties, resources and sacred sites where historic preservation laws alone may not adequately protect the resources or values.
- 03 Native Americans have access to areas that provide them an opportunity to practice traditional, cultural and religious lifeways, such as plant gathering, fishing, hunting and ceremonial activities that are essential in maintaining their cultural identity and the continuity of their culture.
- 04 Traditional ecological knowledge is a valued part of the process when developing and implementing restoration projects and other forest programs.

- 05 The Sierra National Forest provides a setting for the education of tribal youth in culture, history and land stewardship and for the exchange of information between tribal elders and youth.
- 06 Vegetation types and vegetation conditions support continued use by Tribes for traditional, ceremonial and medicinal purposes. Plants known to be used by Tribes that traditionally use the national forest are thriving.

Goals (TRIB-FW-GOAL)

- 01 Manage the land in a spirit of shared stewardship with tribes, supporting tribal rights and recognizing the mutual benefits of restoration.
- 02 Partner with Tribes to contribute to the socioeconomic sustainability of tribal communities.
- 03 Develop memoranda of agreements or other protocols between the national forests and Native American Tribes as appropriate to guide consultation processes, reflect Tribes' particular perspectives and interests, and protect sacred sites.
- 04 Meet regularly with Tribes to better understand their needs and viewpoints. Promote the use of national forest-hosted tribal forums and events, as well as attendance at tribally hosted meetings and events, as a method to ensure consistent contact, consultation and collaboration.

Potential Management Approaches

- Provide training to Sierra National Forest employees about federal tribal trust responsibilities and ways in which the national forest staff honors and implements these responsibilities.
- Consider employee exchange opportunities between the Forest Service and tribes under Service First agreements or other mechanisms. Provide national forest staff with detail opportunities to work with Tribes, and provide tribal staff opportunities to work with the agency, to increase reciprocal understanding and promote use of tribal programs and legislation that is mutually beneficial.

Cultural Resources

The cultural and historic resources on the Sierra National Forest are a vast array of distinct resources that enrich communities, both large and small, through their use, preservation, and interpretation. Programmatic management strategies allow selective use of various cultural resource types, for the greatest public benefit, while minimizing overall impacts and leaving a rich cultural heritage for the future. A myriad of federal laws, regulations, and policies direct the documentation and management of cultural resources.

Cultural resources include prehistoric and historic archaeological sites and districts; historic buildings and structures; ethnographic landscapes; traditional cultural properties; and Native American contemporary use areas. Contemporary use areas include places where traditional forest products are harvested and can include ceremonial and sacred sites. Products harvested annually include but are not limited to teas, medicines, basketry materials, cedar bark, and foods such as acorns, berries, roots, etc. Most contemporary use areas are rooted in past cultural traditions that may have shifted location due to environmental change and forest development.

Cultural resources also include a substantial record of oral histories, photographs, maps, reports, and archaeological artifacts. The documentary record of the people and historic landscapes that are illustrated in these old stories, maps and photographs contribute greatly to the understanding of cultural resources in the national forest.

All cultural resources are not amendable to all potential uses, and vary individually and collectively on what they can offer. Preservation and interpretation of these fragile nonrenewable resources educate people of all ages, races, and walks of life about the cultural connections between people and the forest.

Desired Conditions (CULT-FW-DC)

- 01 Cultural resources (buildings, sites, districts, structures and objects) having scientific, cultural or social values are preserved and protected for their cultural importance. Site integrity and stability is protected and maintained on sites that are susceptible to imminent risks or threats, or where the values are rare or unique. Priority heritage assets are stable and their significant values protected; vandalism, looting, theft and human-caused damage to heritage resources are rare. Site significance and integrity are maintained through conservation and preservation efforts.
- 02 Cultural resources, traditional cultural properties, and sacred sites are protected through project design and consultation with Indian Tribes, tribal cultural leaders, and consulting parties.
- 03 Cultural resources provide educational opportunities that connect people to the land and its history. Through interpretive sites, historic standing structures, and other materials, the Sierra National Forest provides opportunities for an appreciation for the region's history and an awareness of preservation efforts. In some cases, historic routes (e.g., railroad grades) are used for recreation trails with interpretation of their history and historic features. Heritage-based recreation opportunities are connected, where practical, with other recreation opportunities such as trails.
- 04 Public enjoyment is enhanced by opportunities to visit interpretive cultural resource sites. Archaeological site etiquette information is readily available to national forest visitors. Interpretation of the human history of the national forest promotes greater public understanding of the communities that have depended on this landscape for their livelihood, recreation and spiritual wellbeing.
- 05 Opportunities exist for volunteers to participate in cultural resource conservation activities such as research, site stabilization, protection, conservation and interpretation. Cultural resource programs, interpretive presentations or publications are available to provide the public with opportunities to learn about, understand and experience the forest's past.
- 06 Practical opportunities for the rehabilitation and reuse of historic structures to enhance recreation experiences are promoted.

Objective (CULT-FW-OBJ)

- 01 Within 10 years of plan approval, generate at least five cultural resource products like the following: significant interpretation; National Register of Historic Places nominations; thematic contexts; site management plans; 200 acres or more of non-project surveys;

development and testing of predictive models; establishment of formal cultural resource partnerships; and cultural site restoration, stabilization or adaptive reuse.

Goal (CULT-FW-GOAL)

- 01 Priority will be given to preservation, maintenance and adaptive reuse of heritage resources including of all historic structures and buildings as appropriate.

Standard (CULT-FW-STD)

- 01 Include historic property protection provisions in contracts and special use permits.

Guideline (CULT-FW-GDL)

- 01 Cultural artifacts should only be collected for diagnostic dating purposes, answering research questions, or protection of the artifact when special circumstances require collection. Artifact collections should be curated at nearby facilities and accessible to local Tribes and researchers.

Potential Management Approaches

- To protect sites from physical damage and excessive wear and tear, consider user education, restrictions and visitation controls.

Local Communities

Desired conditions and other plan components under this heading include forest management and communication with local communities and other organizations interested in the management of the plan area and national forest resources.

Desired Conditions (LOC-FW-DC)

- 01 National forest personnel communicate with interested local agency leadership, business owners, non-profit organizations, Tribes, community members, and other local organizations on a regular basis to develop mutual understanding regarding national forest management.
- 02 The Sierra National Forest manages the land in a spirit of shared stewardship with local people. Local knowledge and input is an important part of the process when developing and implementing projects.
- 03 National forest uses such as recreation, forest products, carbon sequestration, power generation and water production are provided in an ecologically sustainable way that also contributes to economic and social sustainability in local communities.
- 04 Ecological restoration supports the long-term sustainability of forest resource use and appreciation by communities by reducing the risk of high intensity fires, drought, insects and disease, which may impact forest use opportunities.
- 05 The Sierra National Forest provides interpretation and education opportunities related to culture, history and land stewardship, and provides ample opportunities to connect people of all ages with nature.
- 06 Management of the Sierra National Forest supports community needs by providing employment and training opportunities.

Goals (LOC-FW-GOAL)

- 01 Develop memoranda of agreements or other protocols between the Sierra National Forest and local governments as appropriate to guide coordination processes and reflect local perspectives and interests.
- 02 Identify important socioeconomic locations and activities on the national forest with interested local agencies to promote a common understanding of these important contributions, to help identify potential projects that may enhance community benefits, and help identify mitigation measures that may address adverse impacts to these resources.
- 03 Work with local governments, businesses, and organizations to collect economic data to track changes for businesses in sectors dependent on national forest activities.

Volunteers, Interpretation, Partnerships, and Stewardship

Desired conditions and other plan components for interacting and partnering to work together on shared interests with people, organizations, agencies (local, State, and Federal), Tribes, nonprofits, businesses and communities are included under this heading.

Desired Conditions (VIPS-FW-DC)

- 01 The Sierra National Forest has a network of dependable partners and volunteers who provide additional capacity to effectively and efficiently meet plan desired conditions and deliver services to the public.
- 02 The Sierra staff uses partnerships to build local capacity for providing information and content using the best available methods, including advances in technology.
- 03 Interpretation and conservation education materials and activities convey up-to-date and clear messages about natural and cultural resources, climate change, land stewardship, responsible recreation use and etiquette, and Native American heritage and culture.
- 04 The diverse backgrounds and needs of visitors are considered in the design of communication and interpretive messages.
- 05 Forest Service projects and management actions, as well as the importance of ecosystem services, are communicated to the public in an understandable fashion to increase public awareness of nature and ecosystems.
- 06 Nationally registered historic sites and culturally important properties retain their historic and cultural significance when public use and education opportunities are provided.

Goals (VIPS-FW-GOAL)

- 01 Work with neighboring communities, organizations, state and local agencies, tribes, and other Federal agencies to sustain national forest benefits to people across the broader landscape.
- 02 Regularly report potential projects suitable for partnership and volunteer opportunities to the public.
- 03 Maintain and expand contracting and partnering opportunities with local governments, businesses, and organizations. Develop partnerships that leverage different sources of

funding to support opportunities to contribute to the economic and social sustainability of local communities.

- 04 Work with partners and volunteers to provide recreation opportunities, maintain and enhance recreation settings, collect and manage data on recreation use and demand, and contribute to socioeconomic benefits associated with recreation and tourism.
- 05 Work with skilled stewardship organizations in managing wilderness, wild and scenic rivers, national trails, and other designated areas.
- 06 Work with partners and volunteers in the coordination, development, and delivery of educational and community outreach programs. Actively engage urban populations, youth and underserved communities in programs.
- 07 Work with partners and volunteers to prioritize and complete deferred maintenance and to engage in resource stewardship and restoration.
- 08 Work with site stewards, volunteers, tribal governments, local governments, State and Federal agencies, schools and universities and non-profit groups to protect, rehabilitate and restore cultural resource sites and facilitate development of research, educational and interpretive opportunities.

Potential Management Approaches

- Assess partnership needs and develop priorities to meet those needs using the strategies and tools described in appendix C.
- Develop a partnership and volunteer strategy to define the types of projects suitable for partnership and volunteer opportunities, potential partners and volunteers, and the mechanisms for developing partnerships and volunteer agreements.
- Provide visitor information services at major entry points and areas of concentrated use.
- Provide and update interpretive signage, wayside exhibits, publications and programs using a variety of media and methods.
- Develop bilingual communication tools including publications, information boards and radio spots.

Geology and Minerals

Uses on National Forest System lands include the extraction and potential development of mineral resources, which are managed in a manner that protects natural resources, public health and safety, and are consistent with national forest land management plans. Mineral extraction and development is limited on the Sierra National Forest, although historically mining played an important role in the area. All authorized uses to occupy and use National Forest System lands are evaluated and determined to be in the public interest. Determinations include consultation with other interested parties including Federal, State, and county agencies, Tribes, and non-governmental interests.

Desired Conditions (GEO-FW-DC)

- 01 Mineral resources on National Forest System lands provide for public benefit, while minimizing adverse environmental effects on other national forest resources from mineral exploration, development, and extraction.

Goals (GEO-FW-GOAL)

- 01 Request mineral withdrawals for some areas where there is a need to protect key resources like administrative sites and recreational developments.
- 02 Request public and quasi-public agencies that are contemplating applications resulting in withdrawals, to review their applications with the Forest Service. Seek to minimize impact of withdrawal on mineral development, while protecting area included in the project proposal.
- 03 Undertake efforts to return disturbed areas to former vegetated condition and address potential water quality issues on abandoned mine lands.

Standard (GEO-FW-STD)

- 01 Ensure that plans of operation, reclamation plans, and reclamation bonds address the costs of: removing facilities, equipment, and materials; isolating and neutralizing or removing toxic or potentially toxic materials; salvaging and replacing topsoil; and preparing the seed bed and revegetating to meet the objectives of the land allocation in which the operation is located.

Guidelines (GEO-FW-GDL)

- 01 During mining-related activities, minimize the clearing of trees and other vegetation. Clearing of vegetation should be pertinent to the approved phase of mineral exploration and development.
- 02 Within withdrawn areas, mining claims should be verified by a Forest Service mineral administrator prior to authorizing any surface disturbing mineral activities or authorizing surface access development.

Potential Management Approaches

- For each common variety materials site, prepare a development and rehabilitation plan prior to development and use.
- Encourage use of the most energy efficient sources to obtain marketable, common variety mineral materials.
- Provide assistance in planning for mineral extraction to facilitate reclamation.

Energy

Energy uses on National Forest System lands include hydroelectric and other energy sources, which are managed in a manner that protects natural resources, public health and safety, and are consistent with National Forest System land and resource management plans. Wind and solar development is limited on the national forest. All authorized uses to occupy and use National Forest System lands are evaluated and determined to be in the public interest. Determinations include consultation with other interested parties including Federal, State, and county agencies, Tribes, and nongovernmental interests.

Desired Conditions (NRG-FW-DC)

- 01 Energy resources of National Forest System lands provide for the maximum public benefit that is compatible with protecting ecosystem integrity.

Goals (NRG-FW-GOAL)

- 01 Encourage licensee acquisition of private lands within areas withdrawn by Federal Energy Regulatory Commission, where beneficial for resource protection.
- 02 Actively pursue undergrounding of existing powerlines, where economically feasible and desirable for resource protection.
- 03 When new hydroelectric developments are proposed, or relicensing occurs on existing developments, national forest personnel will coordinate with project proponents and the California Department of Fish and Wildlife to insure associated fish and wildlife habitats and sensitive plant resources are maintained near current levels on new proposals, and improved where needed on relicense proposals.

Standard (NRG-FW-STD)

- 01 For hydroelectric facilities on national forest lands, ensure that special use permit language provides adequate in stream flow requirements to maintain, restore, or recover favorable ecological conditions for local riparian- and aquatic-dependent species.

Infrastructure

Infrastructure on National Forest System lands includes the built property created to support the Sierra National Forest's use and mission. The five major categories of infrastructure are transportation, recreation facilities, administrative facilities, public utilities, and private uses. Other infrastructure includes range-related facilities, and historic facilities.

Transportation refers to the vehicular movement of goods and services for the use of the national forest. Roads managed by public road agencies such as states, counties and municipalities that help provide access to National Forest System lands, are also part of the transportation system. A recreation facility is a discrete area on a national forest that provides recreation opportunities, receives recreational use, and requires a management investment to operate and maintain to standard. Administrative facilities are typically buildings and other related structures and features necessary to support the employees, equipment and activities for management of national forests. Public utility infrastructure is associated with Federal Energy Commission licensed hydroelectric systems, but also includes cable TV, telephone and internet service, and municipal sewer service. Private infrastructure refers to facilities developed in private ownership used in conjunction with special use authorizations. Such facilities include buildings and other kinds of structures and improvements representing a broad range of permitted recreation and land use activities. These activities can serve single purpose use by individuals or families, as well as offer benefits to the public.

Management direction for infrastructure is to provide safe, energy-efficient, accessible, functional, efficient, aesthetically pleasing, and cost-effective administrative buildings and related facilities, while reducing fixed costs. Cost reductions occur through consolidation and decommissioning of obsolete or underutilized buildings, construction of new facilities where and when required, and by conducting proper routine maintenance of existing facilities.

Desired Conditions (INFR-FW-DC)

- 01 Forest infrastructure, such as roads, buildings, campgrounds, water systems and bridges, is managed to provide for the planned use and protection of resources, and is maintained for health and safety.

- 02 Management operations on the Sierra National Forest are energy- and water-efficient.
- 03 Roads allow for safe and healthy wildlife movement in areas of human development. Vehicular collisions with animals are rare.
- 04 Forest resources meet administrative objectives. Vegetation and soils are modified to accommodate facilities, but disturbance is minimized. Fire protection measures are planned to protect improvements.
- 05 Infrastructure (administrative sites, recreation facilities, and roads) has minimal adverse effects to riparian and aquatic resources.

Lands

Uses on National Forest System lands include land acquisition and disposal, and special uses. Statutory authorities govern any land acquisition and disposal, and the authorization and administration of special uses. Special uses are managed in a manner that protects natural resources, public health, and safety and are consistent with National Forest System land management plans. Special uses are administered based on sound resource management objectives and sound business principles. All authorized uses to occupy and use National Forest System lands are evaluated and determined to be in the public interest. Determinations include consultation with other interested parties including Federal, State, and county agencies, Tribes, and nongovernmental interests.

Desired Conditions (LAND-FW-DC)

- 01 Facility ownership and land access management support authorized activities and uses on National Forest System lands. Land exchanges promote improved management of National Forest System lands through consolidated ownership blocks.
- 02 Coordination of land and resource planning efforts with other Federal, State, tribal, county, and local governments, and adjacent private landowners, promotes compatible relationships between activities and uses on National Forest System lands and adjacent lands.
- 03 Isolated or scattered parcels of National Forest System land identified for disposal through exchange provide for a range of objectives and outputs with limited investments.

Goals (LAND-FW-GOAL)

- 01 Participate or collaborate with towns on expansion of existing town boundaries adjoining National Forest System lands.
- 02 Take appropriate criminal and civil action, and resolve cases of unauthorized occupancy and use.
- 03 Resolve unauthorized occupancies through sale or interchange of federal land in conformance with Small Tracts Act, when appropriate.
- 04 Perform special use permit administration, to extent necessary to protect public health and safety.

Guidelines (LAND-FW-GDL)

- 01 Minimize the creation of new rights-of-way where feasible by using existing public or private utility rights-of-way to reduce impacts on other resources.
- 02 Fully develop existing electronic sites before authorizing new sites, unless new sites are determined necessary to fill coverage gaps like cell towers.

Potential Management Approaches

- Where feasible, bury new or reconstructed power distribution lines (33 kilovolts or less) and telephone lines to reduce impacts to resources such as scenery and at-risk species habitat.
- General priorities to acquire land are:
 - a. Priority 1:
 - i. Acquire, through land adjustment, key tracts of non-Federal land (1,000 acres) to enhance management efficiency;
 - ii. Acquire "inholding land" to reduce costs related to right-of-way acquisition and landline survey;
 - iii. Perform special use permit administration, to extent necessary to protect public health and safety;
 - iv. Property lines will be surveyed, marked and posted to standard with emphasis on those areas of potential occupying trespass and production of resource commodities; and
 - v. Resolve unauthorized occupancies through sale or interchange of Federal land in conformance with Small Tracts Act, when appropriate.
 - b. Priority 2: Acquire remaining lands classified as desirable for National Forest status.
 - c. Priority 3: Acquire
 - i. Tracts that because of location or character will become key tracts in the foreseeable future, but for which immediate action is not urgent, and
 - ii. Land intermingled with or adjacent to National Forest System land primarily valuable for watershed purposes, at-risk species, timber production, or public recreation and needed to adequately block in or consolidate National Forest System land.

Chapter 3. Area-specific Desired Conditions and Management Direction

This chapter provides direction for specific management areas or designated areas. Where management areas or designated areas overlap, the more stringent or restrictive direction applies.

Management areas consist of land areas within the planning area that have the same set of applicable plan components. Management areas do not have to be spatially contiguous and typically have a management emphasis. For this plan, management area direction applies to specific geographic boundaries for all management areas except for the strategic fire management zones, which are determined by specific descriptive characteristics. This plan has the following management areas:

- wildlife habitat,
- conservation watersheds,
- sustainable recreation,
- eligible or recommended wild and scenic rivers,
- the Pacific Crest National Scenic Trail, and
- McKinley and Nelder giant sequoia grove.

Designated areas consist of areas or features identified and managed to maintain a special character or purpose. Some are designated by statute (such as wild and scenic rivers or wilderness) and others are administratively designated (like research natural areas). The Sierra National Forest has the following designated areas:

- wilderness,
- wild and scenic rivers,
- Kings River Special Management Area,
- Pacific Crest National Scenic Trail,
- Teakettle Experimental Forest
- inventoried roadless areas,
- national recreation trails,
- research natural areas,
- special interest areas, and
- scenic byways.

Maps of management areas and designated areas can be viewed in appendix A.

Management Areas

Wildlife Habitat

The wildlife habitat management area (WHMA) provides a focus on conservation of old forest-associated species, such as California spotted owl and fisher, and the old forest habitat on which these species depend. This strategy recognizes that individuals of these species can be adversely affected by habitat disturbances, but that much of their habitat is also at risk of loss. The proposed management for the wildlife habitat management area attempts to balance long-term and short-term needs of fisher, California spotted owl, and other old forest-associated species.

Accumulation of fuels from past fire suppression and land management have resulted in the loss of high-quality habitat due to high-severity wildfires. Widespread tree mortality due to insects and

drought has killed many larger and older trees, which are important to these species. The best remaining habitat for these species remains at risk of loss to fire, insects, and drought. Restoration treatments that would improve long-term habitat resilience are needed. At the same time, given that there is less high quality habitat remaining, these species may be more sensitive to the loss of any remaining habitat and other impacts from management activities. There is also a need for management to replace high quality habitat lost to the above disturbances.

The wildlife habitat management area (figure 13, appendix A) focuses on the best remaining habitat outside of wilderness where the need and opportunity to improve resilience is the greatest. It encourages vegetation and fuels treatments, while addressing short-term risks to wildlife by retaining some constraints on management activities and by distributing lighter restoration treatments over a greater area.

Because of the need to protect firefighter safety, many of the management constraints within the wildlife habitat management area do not apply within community buffers. These exceptions are explained in the plan components themselves. See the California spotted owl and fisher plan components for additional exceptions within the community wildfire protection zone, where fire risk is greatest and there is a need for fuel treatments within and near communities. The potential adverse impacts of these exceptions on old-forest habitat are limited by the relatively small geographic scope as the community buffers are relatively small, as is the overall community wildfire protection zone compared to the wildlife habitat management area. See the “Fire” section for more on community buffers and strategic fire management zones.

Desired Conditions (MA-WHMA-DC)

- 01 The wildlife habitat management area consists of resilient, well-distributed, well-connected ecosystems that provide sustainable habitat for old-forest associated species, including fisher and California spotted owl.
- 02 The wildlife habitat management area is characterized by higher concentrations of old forest. It includes some multi-storied canopy conditions, including some shade-tolerant understory trees such as firs and cedars, especially in drainages, swales and canyon bottoms and on north and east-facing slopes.
- 03 The wildlife habitat management area complements aquatic and riparian areas and wilderness areas to provide habitat connectivity.

Standards (MA-WHMA-STD)

- 01 Do not create large areas of open canopy habitat (vegetative cover less than 30 percent) that would completely sever mapped fisher linkage areas. Fuelbreaks that cross mapped fisher linkage areas will be designed to provide scattered pockets of vegetation to avoid creating barriers to fisher movement through the linkage.
Exception: Does not apply in community buffers.

Guidelines (MA-WHMA-GDL)

- 01 When planning vegetation and fuels reduction projects adjacent to mapped Fisher linkage areas, strategically manage vegetation continuity to reduce the risk of widespread crown fire. Do not create large areas of open canopy habitat (vegetative cover less than 30 percent) that would limit fisher use of the linkage area.
Exception: Does not apply in community buffers.

- 02 Prescribed fires should be designed to leave some unburned patches (up to 25 percent of total area within the burn perimeter) to provide heterogeneity and refugia for fisher prey species, especially in larger burn units, if environmental conditions allow.

Exception: Does not apply in community buffers.

Potential Management Approaches

- Identify opportunities to develop future suitable (and resilient) wildlife habitat more quickly through targeted treatments (such as thinning treatments in plantations).

Conservation Watersheds

Conservation watersheds (figure 14, appendix A) are identified as a network of watersheds (multiple 12-digit hydrological unit codes) that:

- have been determined to have a functioning or functioning-at-risk rating based on the Watershed Condition Framework;
- are anchored to areas (like wilderness or inventoried roadless areas) that augment resilience;
- provide for connectivity of species of conservation concern; and
- provide high quality water for beneficial uses downstream.

The management emphasis for conservation watersheds is to maintain or improve, where possible, the functional rating of these systems for the long term and to provide for persistence of species of conservation concern by maintaining connectivity and refugia for these species. The intent of plan direction in conservation watersheds is to focus restoration and monitoring over the long term, while still allowing for other resource uses or activities within these areas.

Desired Conditions (MA-CW-DC)

- 01 Conservation watersheds provide high-quality habitat and functionally intact ecosystems that contribute to the persistence of species of conservation concern and the recovery of threatened, endangered, proposed, or candidate species.
- 02 Conservation watersheds exhibit long-term (multiple planning cycles), high, watershed integrity and aquatic, riparian, and terrestrial ecosystems are resilient to stochastic disturbance events such as wildfires, floods, and landslides.
- 03 The drainage connections between floodplains, wetlands, upland slopes, headwaters, and tributaries are intact and provide for breeding, dispersal, overwintering, and feeding habitats for at-risk species. These areas provide refugia if other areas of the watershed are disturbed by events such as floods, landslides, and fires.
- 04 The ecological integrity of upland vegetation is resilient and maintains soil productivity, water quality, and creates conditions to maintain or improve watershed conditions under the Watershed Condition Framework.

Objective (MA-CW-OBJ)

- 01 Within 15 years of plan approval, maintain, improve or restore conditions on at least 3 subwatersheds within conservation watersheds, based on the watershed condition inventory.

Standards (MA-CW-STD)

- 01 For each existing designated road or planned temporary road, minimize road and landing locations in riparian conservation areas. Do not enter or put fill in wetlands or streams when constructing new or reopening temporary roads. Use alternative methods if necessary to use these routes. Close and restore user-created routes and decommission low priority roads whenever possible during projects. Improve high-use designated roads and trails to minimize disruption of natural hydrologic flow whenever possible and restrict sidecasting as necessary to prevent the introduction of sediment to streams.
- 02 Locate new or relocate existing recreational facilities including trails and dispersed sites away from streams and meadows whenever possible. For existing recreation facilities within riparian conservation areas, evaluate and mitigate impacts, to the extent practicable, to ensure that these do not contribute to degradation of aquatic habitat.

Potential Management Approaches

- Within conservation watersheds, restoration projects and actions are given a high priority for implementation and monitoring.
- Consider Watershed Condition Framework indicators when developing restoration activities within conservation watersheds.

Sustainable Recreation

Destination Recreation Areas

These areas have high levels of recreation, supported by more facilities, amenities, and services than other areas. Iconic destinations or well-known features attract visitors to specific locations (areas such as Lake Edison and Florence Lake). Destination recreation areas provide the most developed recreation opportunities in the national forest. The public will find high densities of visitors with a variety of activities available. Destination recreation areas emphasize such facilities as roads, parking lots, and restrooms. Conservation education and interpretation focus on developing a land ethic as part of the recreation experience. Recreation opportunity spectrum classes within destination recreation areas are primarily rural, and roaded natural, with some semi-primitive motorized and semi-primitive nonmotorized classes (table 9).

Table 9. Acres of land within each recreation opportunity spectrum class in Destination Recreation Areas

Recreation Opportunity Spectrum Class	Acres
Primitive	0
Semi-primitive nonmotorized	0
Semi-primitive motorized	1,045
Roaded Natural	72,662
Rural	55,136

Desired Conditions (MA-DRA-DC)

- 01 Facilities are modern, in good repair, and protect natural resources from damage while providing for visitor comfort and convenience. The developed area footprint within destination recreation areas is visually appealing and well maintained.

- 02 A natural-appearing landscape is retained outside the development footprint.
- 03 Developed sites meet national quality standards.
- 04 National Forest System roads and trails provide visitors easy access to destinations.
- 05 The setting provides amenities and sustainable infrastructure to support a variety of recreational activities in close proximity to each other.
- 06 Available infrastructure and amenities are consistent with user capacity.
- 07 Interpretation and education activities inform visitors about the natural and cultural environment and responsible visitor behavior.
- 08 Traffic and parking does not negatively impact visitor experience.

Potential Management Approaches

- Changes in visitor use levels, patterns of use, or the necessity to protect resources may result in more infrastructure, heavier maintenance, or more controls such as setting capacity limits.
- Consider the future implications of additional infrastructure or development accommodating recreation use in areas adjacent to or within the developed area.
- Consider accommodating additional recreation special use authorizations or partnership agreements to support providing quality recreation experiences, visitor services, interpretation, and education.

General Recreation Areas

These areas are less developed, with fewer facilities, amenities, and services than destination recreation areas. General recreation areas provide opportunities for a range of activities for visitor participation, with moderate levels of use. Over time, general recreation areas may become more developed if necessary to accommodate changing use levels and types and to protect resources. In general recreation areas, multiple uses, other than recreation, are more evident than in destination recreation areas and in challenging backroad areas. Recreationists may be near areas with working landscapes, maintained for multiple uses. These are areas where there are such multiple uses as fuelwood gathering, vegetation management, livestock grazing, utility infrastructure, and mining. Some lands may be modified to meet social, economic, and ecological objectives. Recreation opportunity spectrum classes within general recreation areas are primarily rural and roaded natural, with some semi-primitive motorized and semi-primitive nonmotorized classes (table 10).

Table 10. Acres of land within each recreation opportunity spectrum class in general recreation areas

Recreation Opportunity Spectrum Class	Acres
Primitive	13,744
Semi-primitive nonmotorized	20,732
Semi-primitive motorized	38,008
Roaded Natural	414,048
Rural	65,126

Desired Conditions (MA-GRA-DC)

- 01 In this management area there are limited amenities, few signs, and minor developments.
- 02 Scenic integrity is generally moderate to high. Where developed facilities are present, they are aesthetically incorporated into the landscape. Scenic integrity is maintained at or enhanced from current conditions.
- 03 Recreation use is compatible with other resource management values.
- 04 Developed recreation sites provide opportunities on the more roaded natural, and semi-primitive motorized areas.
- 05 A mosaic of vegetation conditions is often present, with most areas appearing predominantly natural.
- 06 Conflicts between different uses are infrequent.
- 07 As new forms of recreation activities emerge; recreation settings retain their natural character.

Objective (MA-GRA-OBJ)

- 01 Within 15 years of plan approval institute a sustainable, dispersed recreation program.

Goal (MA-GRA-GOAL)

- 01 Provide effective visitor information and programs to inform visitors of appropriate behaviors and stewardship responsibilities.
- 02 Highlight quality recreational experiences so visitors are aware of the recreational opportunities in this area.

Guideline (MA-GRA-GDL)

- 01 Use direct management techniques to reduce impacts on resources.

Potential Management Approaches

- Priority will be given to design new infrastructure and development to manage user conflict and protect resources, as needed.
- Consider accommodating recreation special use authorizations to the extent that the natural and cultural resource can sustain the activity.

Challenging Backroad Areas

These areas are undeveloped, natural, and suited for dispersed recreation use and more challenging activities. Challenging backroad areas are maintained for low visitor use and density and limited Forest Service presence. They are generally in remote areas with few amenities and limited recreation management. The Forest Service may allow the continuation of such multiple uses as fuelwood gathering, vegetation management, livestock grazing, existing utility infrastructure, and mining. Challenging backroad areas provide opportunities for motorized and nonmotorized uses that are challenging, due to terrain and the low density of roads and trails. Use levels are low and users are spread out, minimizing opportunities for conflict. Recreation opportunity spectrum classes within challenging backroad areas are primarily semi-primitive motorized and semi-primitive nonmotorized, with some roaded natural classes (table 11).

Table 11. Acres of land within each recreation opportunity spectrum class in the challenging backroad areas

Recreation Opportunity Spectrum Class	Acres
Primitive	834
Semi-primitive nonmotorized	23,903
Semi-primitive motorized	18,851
Roaded Natural	29,106
Rural	561

Desired Conditions (MA-CBRA-DC)

- 01 These landscapes provide opportunities for challenging and remote recreation experiences.
- 02 These areas contribute to ecosystem and species diversity and sustainability, serve as habitat for fauna and flora, and offer wildlife corridors. These areas provide a diversity of terrestrial and aquatic habitats, and support species dependent on large, undisturbed areas of land.
- 03 Management that supports recreation activities is minimal.
- 04 There is a low density of infrastructure and designated roads and trails.
- 05 Conflicts between different recreation uses are infrequent.
- 06 There are vast areas for nonmotorized cross-country travel offering visitors opportunities for exploration and challenge.
- 07 There is little evidence of cross-country travel.
- 08 As new forms of recreation emerge, recreation settings retain their natural character.

Standards (MA-CBRA-STD)

- 01 Authorize new lands special use permits only where it is appropriate to the remote setting.
- 02 Recreation special use permits must be consistent with low visitor use and the remote setting.
- 03 Any new recreation development must be the minimum necessary to accommodate the activity and protect natural resources.

Eligible or Recommended Wild and Scenic Rivers

The Forest Service determined that 13 river segments (approximately 48.2 miles) are eligible for inclusion in the National Wild and Scenic River System, and are either in whole or in part within the Sierra National Forest’s administrative boundary (figure 16, appendix A).

Congress has not made a final determination on four river segments (approximately 38 miles) that were previously studied for suitability, were recommended by the Forest Service for inclusion in the National Wild and Scenic River System, and are either in whole or in part within the Sierra National Forest’s administrative boundary (figure 16, appendix A). They include the North Fork

San Joaquin River, Middle Fork San Joaquin River (shared with Inyo National Forest and Devils Postpile National Monument), San Joaquin River, and South Fork San Joaquin River (shared with Kings Canyon National Park).

Desired Condition (MA-EWSR-DC)

- 01 Eligible or recommended wild and scenic rivers retain their free-flowing condition, water quality, and specific outstandingly remarkable values. Recommended preliminary classifications remain intact until further study is conducted or until designation by Congress.

Standard (MA-EWSR-STD)

- 01 Management of Forest Service-identified eligible or recommended suitable rivers, are managed to protect outstandingly remarkable values.

Pacific Crest National Scenic Trail

The Pacific Crest National Scenic Trail management area includes the lands in the visible foreground encompassing resources, qualities, values, associated settings and primary uses (figure 17, appendix A). The visible foreground is the distance zone, up to a half mile, that is visible from the trail at a height of 5 feet, and using terrain to define the boundaries. The Pacific Crest Trail travels only through designated wilderness lands.

Desired Conditions (MA-PCTW-DC)

- 01 The Pacific Crest National Scenic Trail provides for outstanding journeys on foot or on horseback along the Pacific mountain ranges. These primitive forms of travel, harken back to a simpler and more rugged time. Tranquility and closeness with nature can be found consistently along the trail, evoking a feeling of extended retreat from civilization, even if only venturing out for a day.
- 02 The recreation setting is consistent with or complements the primitive recreation opportunity spectrum.
- 03 Outstanding panoramic views of natural landscapes in a tranquil scenic environment are provided when possible.
- 04 Scenic integrity objectives and scenic stability levels are maintained to retain panoramic views and landscape connectivity. Lands viewed beyond the management area meet the scenery integrity objective of at least moderate.

Standard (MA-PCTW-STD)

- 01 Prohibit heavy equipment line construction on the Pacific Crest National Scenic Trail, unless necessary for emergency protection of property and safety.

Guideline (MA-PCTW-GDL)

- 01 To maintain and protect scenic qualities, management activities should be consistent with the scenic integrity objective of very high.

Potential Management Approaches

- Reconstruct or relocate existing portions of the Pacific Crest National Scenic Trail as needed to enhance the recreation experience and protect resources.

- Use key observation points to evaluate the condition of scenery resources.
- Implement visitor use management strategies to minimize impacts to desired conditions for natural resources and visitor experiences through education, site management, regulation, and enforcement.

McKinley and Nelder Giant Sequoia Grove

On July 14, 1992, President George H.W. Bush proclaimed that naturally occurring old-growth giant sequoia groves within the Sierra National Forest be managed, protected, and restored so that present and future generations would be able to benefit from and enjoy them. The proclamation required that the boundaries of these groves be delineated in order to provide for grove protection and management. The proclamation also required that these giant sequoia groves would not be managed for timber production, would be protected as natural areas with minimal development, and would be withdrawn from all forms of mineral entry subject to existing valid rights.

The Sierra National Forest contains the McKinley and Nelder giant sequoia grove management areas, each of which includes the tree-line grove boundary plus a 400-meter buffer (figure 18, appendix A).

Desired Conditions (MA-GSG-DC)

- 01 The structure, composition, and function of the giant sequoia groves are within the natural range of variation. The groves are structurally heterogeneous and compositionally diverse, and provides habitat for a variety of plant and animal species.
- 02 Fire occurs as a key ecological process in the giant sequoia groves, maintaining ecosystem integrity and function. Fires burn primarily at low to moderate severity with limited patches of high severity creating canopy gaps of variable sizes and shapes (generally less than one-half acre) and bare mineral soil to promote sequoia regeneration.
- 03 Giant sequoias, especially large and old trees, are resilient to stressors including insects, pathogens, uncharacteristic wildfires, drought, and climate change.
- 04 Giant sequoia trees are successfully regenerating and recruiting into older age classes.
- 05 Giant sequoia groves provide a diverse array of natural, scenic, historic, and scientific resources for the benefit and enjoyment of current and future generations.

Goal (MA-GSG-GOAL)

- 01 Work cooperatively with researchers and other organizations to develop appropriate ecological restoration measures in giant sequoia groves impacted by drought, bark beetle outbreaks, or uncharacteristic wildfire.

Suitability (MA-GSG-SUIT)

- 01 The following uses are not suitable in giant sequoia groves:
 - All forms of mineral entry including mineral or geothermal leasing.
 - Timber production, although harvest of timber is allowed for purposes of restoration and maintenance of desired conditions, or as needed for safety of the public or personnel.
 - Groundwater diversion or alteration.

Guidelines (MA-GSG-GDL)

- 01 Within giant sequoia groves, thin conifers to increase heterogeneity and resilience, emphasizing retention of the oldest and largest trees such as giant sequoias and pines. Large trees with deformities, broken tops, large branches, and cavities should be retained for wildlife habitat whenever possible.
- 02 Limit mortality of large and old giant sequoias during prescribed fire or when managing wildfires to meet resource objectives. Litter and duff should be removed at least 2 feet and shrubs and small trees at least 6 feet from the base of large and old sequoias (especially those containing cat faces) to limit fire impacts.
- 03 Ecological and hydrologic function of giant sequoia groves should be maintained or restored. Roads, trails, off-highway vehicle trails, staging areas, developed recreation sites, dispersed campgrounds, special use permits, and day use sites that have been identified as contributing to degradation of ecological or hydrologic function in giant sequoia groves should have corrective actions implemented where possible.

Designated Areas

Wilderness

Congress has designated five wilderness areas that are either in whole or in part within the Sierra National Forest's administrative boundary (figure 20, appendix A). These wilderness areas comprise about 44 percent of the national forest. They include the Ansel Adams Wilderness (shared with the Inyo National Forest), Dinkey Lakes Wilderness, John Muir Wilderness (shared with the Inyo National Forest), Kaiser Wilderness, and Monarch Wilderness (shared with the Sequoia National Forest).

In addition to plan components that apply to all designated wilderness areas, the Ansel Adams, John Muir, Dinkey Lakes and Kaiser Wildernesses have additional desired conditions that are specific to three different types of recreation categories occurring across these wildernesses (figure 21, appendix A). Individual wilderness plans provide wilderness area specific guidance in addition to the strategic-level guidance provided in this land management plan.

All Designated Wilderness

Desired Conditions (DA-WILD-DC)

- 01 The wilderness character of each wilderness, including the qualities of untrammeled, natural, undeveloped, opportunities for solitude or primitive recreation, and other features of value (such as ecological, geological, or other features of scientific, educational, scenic, cultural or historical value specific to each wilderness area) are preserved and, when possible, enhanced.
- 02 Watersheds are functioning properly and exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural and current potential condition.
- 03 Fire is restored as an ecosystem process and natural disturbance agent in wilderness where possible.
- 04 Each wilderness area accommodates levels of recreation use that are ecologically sustainable.

- 05 Overall recreation use is maintained at a level that protects opportunities for solitude and wilderness character.
- 06 Forest visitors find opportunities for primitive recreation and solitude across the wilderness.
- 07 National Forest System trails that access wilderness are part of a high-quality wilderness experience for visitors. National Forest System trails meet national quality standards, with minimal deferred maintenance and adhere to the national trail classification system. Trails in wilderness are located in resilient areas, and do not cause adverse impacts to at-risk species, water quality, soils, hydrologic connectivity, or cultural resources.
- 08 Concentrated use and associated resource impacts are directed to more resilient parts of the landscape when possible, and prevented from expanding in fragile areas.
- 09 Resource impacts of user-created trails are reduced.
- 10 If a wilderness permit system is in place, the permit system provides equity in access for all authorized and legitimate uses.

Goal (DA-WILD-GOAL)

- 01 Restore to natural conditions campsites that adversely affect water quality.

Suitability (DA-WILD-SUIT)

- 01 Except as specifically provided for in the Wilderness Act and subject to valid existing rights, the following uses are not suitable within designated wilderness.
 - commercial enterprise;
 - temporary roads;
 - use of motor vehicles, motorized equipment or motorboats;
 - landing of aircraft;
 - mechanical transport; and
 - structures or installations.

Guideline (DA-WILD-GDL)

- 01 Limit party size and number of stock per party to a level that protects social and natural resource values. The level may vary within or between wilderness areas.

Ansel Adams, John Muir, Dinkey Lakes, and Kaiser Wildernesses

See figure 21 for locations of the different wilderness recreation categories.

Recreation Category 1

Desired Conditions (DA-WILD-REC1-DC)

- 01 Opportunities for solitude are highest among the recreation categories. Evidence of human activities is predominantly absent. Encounters with other visitors while traveling or camping are very infrequent. This environment offers the highest degree of challenge, self-reliance and risk.

- 02 An unmodified natural environment characterizes the area. Ecological and natural processes are minimally affected by the action of users. Environmental impacts are low and restricted to minor losses of vegetation where camping occurs and along travel routes. Most impacts recover on an annual basis and are apparent to few visitors.
- 03 Campsites are at low-density levels and show minor impacts that will rarely persist year to year.
- 04 There is very little vegetation loss or alteration of duff and litter layer by human use.
- 05 Riparian, lakeshore and stream channel conditions show no measurable degradation due to human uses.

Recreation Category 2

Desired Conditions (DA-WILD-REC2-DC)

- 01 High occasions of solitude are experienced while traveling or camping outside the primary trail corridors. Along primary trail corridors, encounters with other visitors while traveling or camping is higher than Category 1 areas but far less than Category 3 areas. This environment offers a high degree of challenge, self-reliance, and risk.
- 02 A highly unmodified natural environment characterizes the area. In the few concentrated areas of moderate use, natural conditions may be more affected by the actions of users. A higher level of management is present to mitigate these impacts. Impacts may persist from year to year and may be apparent to some visitors. Most visitors will not discern impacts.
- 03 Concentration of campsites exists at trail junctions and popular destination points. No new sites are forming over time. Campsites may occasionally be within sight and sound of others. Bare mineral soil may exist on some sites and may persist from year to year. Outside these areas, campsites and impacts associated with camping is light.
- 04 Moderate soil compaction and loss of vegetation occurs. Minimal erosion occurs on disturbed sites.
- 05 Riparian, lakeshore and stream channel conditions show a temporary change within standards, which could persist from year to year at a few sites. Impacts are mitigated and prevented to reduce long-term impacts.
- 06 Management emphasizes sustaining and enhancing the natural ecosystem. Signing is minimal, providing for resource protection and direction at major trail intersections. Management may frequently include direct, on-site actions. Site-specific regulations may be in place to meet management objectives for resource protection. Primary trail corridors have highly maintained and constructed trails that support access to popular destinations and travel routes. Secondary trails allow for moderate dispersal of use but are maintained in a manner consistent with a more pristine and primitive experience than primary trail corridors.

Recreation Category 3

Desired Conditions (DA-WILD-REC3-DC)

- 01 Recreation use levels provide fewer opportunities for solitude than the other two categories, yet high opportunities for solitude exist during the non-peak use season.

During peak use season, opportunities for experiencing isolation from the sights, sounds, and impacts of human activities is less than other categories. The probability of encountering other visitors on the trail and at campsites is more than other areas.

- 02 A highly unmodified natural environment characterizes the area. In the few concentrated areas of moderate use, natural conditions may be more affected by the actions of users. A higher level of management is present to mitigate these impacts. Impacts may persist from year to year and may be apparent to some visitors. Most visitors will not discern impacts.
- 03 Concentration of campsites is moderately high at destinations and along travel corridors. The number of sites accommodates peak use to prevent the formation of new sites. Bare mineral soil may exist on some sites and may persist from year to year.
- 04 Moderate soil compaction and loss of vegetation, litter, and duff occurs on many visitor created trails, in camp areas, and in areas used by livestock. Minimal erosion occurs on disturbed sites and is mitigated to prevent long-term impacts.
- 05 Riparian, lakeshore, and stream channel conditions show temporary changes within standards, which could persist from year to year at some sites. Mitigation measures accommodate moderate levels of human recreation impacts.
- 06 Management emphasizes sustaining and protecting natural conditions. Management is often direct, and management presence to mitigate visitor use impacts on resources is more noticeable. Campsites may be identified and delineated. Site-specific closures to camping, campfires, and site-specific regulations may be in place. Signs used for resource protection are present in these areas. A moderate density of social trails is present in destination camping areas. The Forest Service has a presence to provide education contact and manage high levels of use.

Wild and Scenic Rivers

Congress has designated five wild and scenic rivers (approximately 43 miles) that are either in whole or in part within the Sierra National Forest's administrative boundary (figure 16, appendix A). They include the Merced River (shared with Yosemite National Park and the Bureau of Land Management), South Fork Merced River (shared with Yosemite National Park), Kings River, Middle Fork Kings River (shared with the Kings Canyon National Park), and South Fork Kings River (shared with Sequoia National Forest).

Designated Wild and Scenic Rivers

Desired Conditions (DA-WSR-DC)

- 01 The free flowing condition, water quality and specific outstandingly remarkable values of designated wild and scenic rivers are protected or enhanced. Development is consistent with the river's classification, and management is consistent with a current comprehensive river management plan.
- 02 Public recreation and resource uses are provided that do not adversely impact or degrade the values for which the river was designated.

Standards (DA-WSR-STD)

- 01 Road and motorized trail access to rivers must be consistent with river classification, travel management direction and the recreation opportunity spectrum classification.

- 02 In recreation and scenic segments, expansion of structural improvements may only be authorized outside designated wilderness and must meet assigned scenic integrity objectives and allow for user access.
- 03 Within the wild segment, structural improvements will be limited to existing structures.
- 04 Utility rights-of-way within recreation and scenic segments will be authorized only when there are no alternatives.
- 05 Utility rights-of-way will not be authorized within wild segments.
- 06 Uses of facilities in existence at the date of designation that do not conform to the river's classification should be allowed so long as the river's free-flowing condition, water quality, and outstandingly remarkable values are protected.
- 07 If new recreation facilities are needed, they should be consistent with river classification, recreation opportunity spectrum classification, scenic integrity objectives, and located to protect outstandingly remarkable values.

Potential Management Approaches

- When evaluating a federally assisted water resources project under the Wild and Scenic Rivers Act section 7(a) and where a comprehensive river management plan has not yet been completed, use the documented baseline conditions at date of designation for free flow, water quality and outstanding remarkable values to evaluate effects of the project. The river's classification is not a factor in the evaluation.
- Consider closing and restoring dispersed campsites to natural conditions that are adversely affecting water quality.

Kings River Special Management Area

The Kings River Special Management Area includes approximately 49,000 acres (figure 20, appendix A). In 1987, Congress gave special designation to this area to provide for public outdoor recreation use and enjoyment; for protection of the natural, archaeological, and scenic resources; and for fish and wildlife management. The Sierra National Forest administers the Kings River Special Management Area, including the 24,290 acres that are within the northern portion of the Sequoia National Forest Giant Sequoia National Monument. The statute creating the Kings River Special Management Area (Public Law 100-150) takes precedence over the 2000 Presidential Proclamation that created the Giant Sequoia National Monument. Management of the Kings River Special Management Area is guided by the 1991 Kings River Special Management Area implementation plan.

Pacific Crest National Scenic Trail

In 1968, Congress designated the Pacific Crest National Scenic Trail. The Pacific Crest Trail is a continuous long distance trail from the Mexican border near Campo, California to the Canadian Border at Boundary Monument 78 near Manning Provincial Park, Canada. The Sierra National Forest manages 27 miles of the Pacific Crest Trail, all of which are in wilderness (figure 19, appendix A).

The Pacific Crest National Scenic Trail Comprehensive Plan was signed in 1982 by the Chief of the Forest Service; national forests are expected to integrate the direction and guidance provided

by this plan into their land management planning process. Plan components for the Pacific Crest Trail are organized under the Pacific Crest National Scenic Trail management area section above.

To ensure the conservation of the Pacific Crest Trail's nationally significant wild, scenic, natural and heritage resources, and to maximize its intended recreation opportunities, the trail's entire length, together with sufficient land area on both sides to safeguard and preserve its character, should be publically owned, permanently protected, and managed as a single entity across jurisdictions. The investment of citizen stewards offers another critical thread of continuity from Mexico to Canada. The Pacific Crest Trail experience should favor panoramic views of undisturbed landscapes in an uncrowded, nonmechanized, quiet, and predominantly natural environment. It should feature diverse, untrammelled ecosystems and historic high-country landmarks while avoiding, as much as possible, road crossings, private operations, and other signs of modern development. Trail facilities such as campsites, water sources and other amenities for hiker and pack-and-saddle use should be simple. Forest plan components for management of the Pacific Crest Trail are listed on page 98 in the "Management Areas" section of the plan.

Teakettle Experimental Forest

Teakettle Experimental Forest was designated in 1938 for watershed research on water quality and quantity (figure 19, appendix A). The area is over 3,200 acres of old-growth forest at 6,500 to 9,200 feet elevation and consists primarily of mixed-conifer and red fir forest common on the western slope of the Sierra Nevada. Recent research at this experimental forest has provided invaluable, science-based information related to the long-term effects of restoration treatments on forest ecosystem function and health. While it is on the Sierra National Forest, it is administered by the Pacific Southwest Research Station.

Desired Conditions (DA-TEF-DC)

- 01 The Teakettle Experimental Forest is managed to provide research and development of silviculture, wildlife, watershed, and other applied forest management practices. Management activities permitted in the experimental forest do not conflict with objectives of ongoing research.

Suitability (DA-TEF-SUIT)

- 01 The Teakettle Experimental Forest is suitable for livestock grazing.
- 02 Mineral exploration and development are not permitted.
- 03 Off-highway vehicle use is prohibited in the Teakettle Experimental Forest.
- 04 The Teakettle Experimental Forest is not suitable for timber production. Timber is managed to achieve research goals.

Standards (DA-TEF-STD)

- 01 Recreation opportunities are limited, occur in nonroaded natural settings, and do not conflict with ongoing research.
- 02 The transportation system is limited and does not conflict with ongoing research. Fire protection is carried out to protect research values and minimize acreage burned.

Inventoried Roadless Areas

The 2001 Roadless Area Conservation Rule (Roadless Rule) established prohibitions and permissions on road construction, road reconstruction, and timber harvesting on 58.5 million acres of National Forest System lands across the United States. This plan does not incorporate the Roadless Rule; this direction is included to show the management direction the Roadless Rule provides and in a format that explains Roadless Rule management direction in the context of other forest plan direction. See figure 20 in appendix A for locations of inventoried roadless areas.

Desired Conditions (DA-IRA-DC)

- 01 The roadless character of areas identified under the 2001 Roadless Area Conservation Rule is protected and conserved.
- 02 The roadless area characteristics present in the area are maintained, including:
 - a. High quality or undisturbed soil, water, and air;
 - b. Sources of public drinking water;
 - c. Diversity of plant and animal communities;
 - d. Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land;
 - e. Primitive, semi-primitive nonmotorized, and semi-primitive motorized classes of dispersed recreation;
 - f. Reference landscapes;
 - g. Natural appearing landscapes with high scenic quality;
 - h. Traditional cultural properties and sacred sites; and
 - i. Other locally identified unique characteristics.

Suitability (DA-IRA-SUIT)

- 01 Inventoried roadless areas are not suitable for timber production. Timber harvest may be allowed for other resource benefits consistent with the 2001 Roadless Area Conservation Rule.
- 02 Inventoried roadless areas are not suitable for road reconstruction or new permanent road construction, except for the exceptions listed in the 2001 Roadless Area Conservation Rule.
- 03 Inventoried roadless areas are suitable for restoration activities that can be accomplished consistent with the 2001 Roadless Area Conservation Rule.

Guidelines (DA-IRA-GDL)

- 01 Management activities should maintain the roadless character of the inventoried roadless area.

National Recreation Trails

The Secretary of Agriculture has designated five national recreation trails on the Sierra National Forest: the Black Point National Recreation Trail, Rancheria Falls National Recreation Trail,

Kings River National Recreation Trail, Lewis Creek National Recreation Trail, and Shadow of the Giants National Recreation Trail (figure 19, appendix A).

Desired Conditions (DA-NRT-DC)

- 01 National recreation trails meet the intended goals and preserve the values and recreation opportunities for which they were established.
- 02 The trail setting provides a variety of opportunities that complement the existing recreation opportunity spectrum class where the trail segment is located.
- 03 Foreground views from the trail meet a scenic integrity objective at least as high as shown on the minimum scenic integrity map. Middle and background views meet or exceed a scenic integrity objective of at least moderate.
- 04 National recreation trails meet trail management objectives and the maintenance standards for trail class and managed use.

Guideline (DA-NRT-GDL)

- 01 During management activities, maintain safe public access to national recreation trails if practicable.

Research Natural Areas

The Regional Forester, with concurrence of the research station director, designates research natural areas. The purpose of research natural areas is to maintain biological diversity and to contribute to a network of representative ecosystems across the nation. Research natural areas are intended to provide ecological baseline data, and to be used for education and research that results in improved management of all National Forest System lands.

The Sierra National Forest has two established research natural areas: Backbone Creek Research Natural Area, for tree anemone, *Carpenteria californica*, a rare shrub; and Sacate Ridge Research Natural Area, for blue oak-foothill pine and other foothill vegetation types (figure 19, appendix A). The Sierra also has three proposed research natural areas: proposed Bishop Creek Research Natural Area, for western ponderosa pine; proposed Home Camp Creek Research Natural Area, for white fir-red fir vegetation; and proposed Heitz Meadow Mixed Conifer Research Natural Area, for mixed conifer. Management of research natural areas is guided by individual management plans and by direction provided in the Forest Service Manual (FSM 4063). The following plan direction for established research natural areas also applies to proposed research natural areas.

Standards and guidelines for constraints on fire management activities within research natural areas are included under the components for “Fire” in chapter 2.

Desired Conditions (DA-RNA-DC)

- 01 Research natural areas have excellent examples of the ecological features and values for which they were established. They are generally natural appearing, and ecological processes such as plant succession, fire, and insect and disease activity function with limited human influences. They serve as areas for the study of ecosystems and ecological processes, including succession, and as baseline areas for measuring ecological change due to disturbances or stressors like climate change.

Suitability (DA-RNA-SUIT)

01 The following uses are not suitable in research natural areas:

- Timber production
- Other forest product gathering that impact natural ecological processes or are inconsistent with the objectives for which the research natural area was established

Special Interest Areas

Special interest areas are designated by the Regional Forester if less than 100,000 acres and by the Secretary of Agriculture if larger than 100,000 acres. Special interest areas are addressed in Forest Service Manuals 2360 and 2372. Special interest areas may be designated for scenic, geological, botanical, zoological, paleontological, archaeological/historical, or recreational values, or combinations of these values. Special interest area designation allows national forests to meet internal and public interest in recognizing special values of certain areas and to tailor land uses to interpret, maintain and enhance those special features. Land uses in a special interest area will vary with the type of feature recognized, for example, a recreation special interest area could have extensive developments to increase visitor access. Sierra National Forest special interest areas include two designated and one proposed botanical areas, one historical area, and three designated and two proposed geologic areas (figure 19, appendix A):

- Carpenteria Botanical Area
- McKinley Grove Botanical Area
- Proposed Devils Peak Botanical Area
- Nelder Grove Historical Area
- Courtright Intrusive Contact Zone Geological Area
- Dinkey Creek Roof Pendant Geological Area
- Kings Cavern Geological Area
- Proposed Crater Lake Meadow Geological Area
- Potential Kaiser Wilderness Geological Area.

Management of these special interest areas is guided by area specific management plans.

Scenic Byways

Two national scenic byways have been administratively designated on the Sierra National Forest (figure 20, appendix A). The 70-mile Sierra Heritage Scenic Byway ties the San Joaquin Valley to eight foothill and mountain communities, climbing to 9,000 feet in elevation in the Sierra Nevada, to within viewing distance of the Kaiser, Dinkey Lakes, and Ansel Adams and John Muir Wilderness areas. This corridor has many snow parks and access to popular off highway motorized trails, as well as scenic viewing opportunities.

The 100-mile Sierra Vista Scenic Byway meanders through the national forest and highlights some of the most beautiful scenery and views of the Sierra Nevada. The byway starts at 3,000 feet in elevation and climbs to more than 7,000 feet, with sights that include Redinger Overlook, Jesse Ross Historic Cabin, Mile High Vista, Jackass Rock, Arch Rock, Mammoth Pool, Clover Meadow, Eagle Beaks, Portuguese Creek, the Balls, Globe Rock, Beasore Meadows, Cold Springs Summit, Fresno Dome, Kelty Meadow, Soquel Meadow and Nelder Grove of Giant Sequoias.

Chapter 4. Forest Plan Monitoring

Introduction

Monitoring forms the basis for continuous improvement of the forest plan and provides information for adaptive management within the plan area. The forest plan monitoring program enables the responsible official to help determine where and when changes are needed in the forest plan.

The forest plan monitoring program measures management effectiveness and assesses progress toward achieving or maintaining the forest plan desired conditions and objectives through a set of monitoring questions and associated indicators. These are designed to inform management of resources in the plan area, including testing relevant assumptions, tracking relevant changes, and measuring management effectiveness. By using appropriate indicators that can be measured, observed, or described over time, management actions can be evaluated to determine if they are trending conditions toward the anticipated results. Not every plan component will have a corresponding monitoring question or indicator because monitoring in the plan monitoring program is focused on priority management questions and related core information that are achievable within the financial and technical capability of the Sierra National Forest.

The plan monitoring program is just one piece of the monitoring that occurs within the national forest and region; project and activity monitoring, and resource or species monitoring conducted by other agencies and organizations may inform the plan monitoring program and adaptive management of the plan. To address plan monitoring program questions and associated indicators that can best be answered at a broader geographic scale than one plan area, the Regional Forester has developed a draft broader-scale monitoring strategy. The intent of the broader-scale monitoring strategy is to inform decision-making regarding the effectiveness of the forest plan, within the context of an all-lands approach, and realize efficiencies by coordinating similar monitoring across units, integrating agency protocols and leveraging partner and adjacent landowner monitoring work.

The monitoring program outlined below considers the 2014 science synthesis,⁹ 2014 bio-regional assessment,¹⁰ and 2013 forest plan assessment.¹¹ Existing national and regional monitoring programs, like the Forest Inventory and Analysis National Program, the National Visitor Use Monitoring Program, the current forest plan monitoring, and ongoing monitoring with the States contribute to the plan monitoring program data sources. Monitoring is also coordinated with other Forest Service program mission areas (such as Forest Service State and Private Forestry and Research and Development), other Federal and State agencies, Tribes, partners, and the public.

⁹ Long, Jonathan W.; Quinn-Davidson, Lenya; Skinner, Carl N., eds. 2014. Science synthesis to support socioecological resilience in the Sierra Nevada and southern Cascade Range. Gen. Tech. Rep. PSW-GTR-247. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 723 p.

¹⁰ United States Department of Agriculture, Forest Service. 2014b. Final Sierra Nevada Bio-Regional Assessment. Management Bulletin R5-MB-268. Vallejo, CA. United States Department of Agriculture, Forest Service, Pacific Southwest Region

¹¹ USDA, Forest Service. 2013. Final Sierra National Forest assessment. U.S. Department of Agriculture, Forest Service, Pacific Southwest
<http://www.fs.usda.gov/detail/r5/landmanagement/planning/?cid=STELPRD3802842>

National forest-level monitoring information will be collected every year for many, but not all, monitoring questions. The collected information will be evaluated on a biennial basis. The first evaluation report is anticipated no later than 2 years after the effective date of the forest plan decision. This biennial evaluation includes information gathered through this plan monitoring program and may include relevant information from the Pacific Southwest Region's broader-scale monitoring strategy. A written report of the evaluation will be made available to the public. The evaluation will identify if changes may be warranted to the plan, plan monitoring program, management activities, or assessment. Where frequency of monitoring is longer than 2 years, evaluation of that information will be made in the next biennial evaluation. For example, a data collection program that takes place once every 5 years, will then be included in every third evaluation report.

The plan monitoring program contains one or more monitoring questions and associated indicators addressing each of the following topics:

1. The status of select watershed conditions.
2. The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
3. The status of focal species to assess the ecological conditions required under the Code of Federal Regulations, specifically 36 CFR 219.9.
4. The status of a select set of ecological conditions required under 36 CFR 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.
5. The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.
6. Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
7. Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.
8. The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)).

Some monitoring questions and associated indicators may address more than one of these required topics. The entire plan monitoring program must be within the financial and technical capability of the Sierra National Forest, augmented by broader-scale monitoring by the Pacific Southwest Region and other monitoring with partners.

The plan monitoring program for the Sierra National Forests is presented below in a set of tables, each related to one of the eight required topics previously listed. For clarity, monitoring questions for terrestrial ecosystems and aquatic ecosystems are presented in separate tables. It should be noted that information from one topic can also be used to inform another topic. For example, information from the focal species topic (number 3) could be used in the evaluation of the at-risk species topic (number 4). In the tables, each row represents a single monitoring question and associated indicators used to respond to a selected desired condition or objective. The desired conditions are generally complex statements that cannot be fully monitored. Therefore, the monitoring questions and associated indicators focus on some core aspect of the desired condition

related to the required monitoring item and that are practicable to be monitored. Details of the plan monitoring program—including monitoring and analysis protocols, data collection schedules, responsible parties, and data management—will be part of a separate monitoring guide.

Monitoring Program

Watershed Conditions

These monitoring questions and their associated indicators are related to water resources and watershed conditions in the forest plan area. The geographic scale may extend beyond the plan area and may include receiving areas for water that flows off the plan area.

Table 12. Monitoring questions and associated indicators that evaluate watershed conditions

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
WS01	<p>WTR-FW-DC-03 Watersheds have the following conditions: fully functioning or trending toward fully functioning and resilient; recover from natural and human disturbances at a rate appropriate with the capability of the site; and have a high degree of hydrologic connectivity laterally across the floodplain and valley bottom, and vertically between surface and subsurface flows. Physical (geomorphic, hydrologic) connectivity and associated surface processes (i.e., runoff, flooding, in-stream flow regime, erosion and sedimentation) are maintained and restored. Watersheds provide important ecosystem services: high quality water; recharge of streams and shallow groundwater; maintenance of riparian communities; and moderation of climate change and atmospheric deposition. Watersheds maintain long term soil productivity.</p>	<p>To what extent are watersheds in proper functioning condition being maintained, and watersheds in altered or impaired condition being improved?</p>	<p>Watershed Condition Framework classification</p>

Terrestrial Ecosystems

A select set of ecological conditions is monitored for terrestrial ecosystems. The monitoring questions and indicators are selected to measure the effectiveness of the forest plan to maintain or restore ecological conditions for key ecosystem characteristics associated with composition, structure, function and connectivity.

Table 13. Monitoring questions and associated indicators that evaluate conditions for terrestrial ecosystems

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
TE01	<p>TERR-OLD-DC-02 The landscape contains a mosaic of vegetation types and structures that provide foraging and breeding habitat, movement, and connectivity for a variety of old forest-associated species.</p>	<p>To what extent are the old forest areas approaching the natural range of variation (i.e., NRV) and returning to a natural fire return interval?</p>	<ul style="list-style-type: none"> • Extent of large trees, snags, and large downed logs with moderate to high canopy cover • Acres of treated forest, by treatment type, and ecosystem type • Fire return interval departure • Fire severity
TE02	<p>TERR-MONT-DC-03 At the landscape scale, white pines (such as sugar pine and western white pine) are healthy and vigorous with a low incidence of white pine blister rust. Individual trees and the stands they occur in are resilient to moisture stress, drought, and bark beetles. White pine blister rust-resistant trees are regenerating, and populations are sustained.</p> <p>TERR-MONT-DC-01 At the landscape scale, the Sierra Nevada montane landscape is a heterogeneous mosaic of open and closed canopy forest patches, meadows and riparian areas. These ecosystem types occur in a complex mosaic of different densities, sizes, and species mixed across large landscapes that vary with topography, soils, and snow accumulation. The composition, structure, and function of vegetation make these ecosystems resilient to fire, drought, insects, pathogens, and climate change. The mix of seral stage patches, and open versus closed canopied areas, varies by forest type as described in table 1. Large and old trees are common in later seral stages throughout the landscape and in varying densities (see “Old Forest Habitats” section).</p>	<p>What is the status and trend of ponderosa, Jeffrey, and sugar pine in select locations?</p>	<ul style="list-style-type: none"> • Pine relative density; basal area; average diameter at breast height; regeneration density; and health • Acres of treated forest, by treatment type and ecosystem type

Aquatic Ecosystems

A select set of ecological conditions are monitored for riparian and aquatic ecosystems. The monitoring questions and indicators are selected to measure the effectiveness of the plan to maintain or restore ecological conditions for key ecosystem characteristics associated with composition, structure, function and connectivity.

Table 14. Monitoring questions and associated indicators that evaluate ecological conditions for aquatic and riparian ecosystems

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
AE01	WTR-RCA-MEAD-DC-05 Meadows have substantive ground cover and a rich and diverse species composition, especially of grasses and forbs. Meadows have high plant functional diversity with multiple successional functional types represented. Perennial streams in meadows contain a diversity of age classes of shrubs along the streambank, where the potential exists for these plants.	What is the vegetative condition of selected meadows?	Rangeland ecological condition Species (composition) richness, species diversity, and (status of) plant functional groups Range greenline monitoring Vegetation community types Greenness or wetness indices
AE02	MA-RCA-DC-05 Riparian areas provide a range of substrates to sustain habitat for a variety of aquatic and terrestrial fauna within the natural capacity of the system. MA-RCA-DC-06 Soil structure and function is sustained to infiltrate and disperse water properly, withstand erosive forces, sustain favorable conditions of stream flow, and cycle nutrients. Associated water tables support riparian vegetation and restrict nonriparian vegetation.	To what extent are riparian areas functioning properly after selected management activities?	Vegetation cover, structure, and composition Floodplain and channel physical characteristics Acres of riparian areas restored

Focal Species

Focal species are a small subset of species whose status permits inference to the integrity of the larger ecological system to which they belong. Focal species monitoring provides information regarding the effectiveness of the plan in providing the ecological conditions necessary to maintain the diversity of plant and animal communities and the persistence of native species in the plan area. They should act as indicators for the attributes of community composition, structure, connectivity or function, or factors that regulate them.

An effective focal species or assemblage of species will be sensitive to the ecosystem components or habitat attributes of concern. Monitoring questions should relate the species to the ecological condition and reason for its selection; indicators may include affected attributes of the species, such as presence or occupancy, habitat use, reproductive rate and population trends. If the focal species' sensitivity to habitat changes cannot be directly attributable to a cause and effect relationship, then the influence of habitat change on the focal species may not be separable from the influence of other factors on the species, such as climate change, predation, disease or competition.

Focal species are intended to reduce the cost and effort of ecosystem monitoring and should only be used when direct measurement of resources is not efficient or practical.

Table 15. Monitoring questions and associated indicators that evaluate the status of focal species

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
FS01	WTR-FW-DC-02 Water quality supports State-designated beneficial uses of water. Water quality is sustained at a level that retains the biological, physical, and chemical integrity of aquatic systems and benefits the survival, growth, reproduction, and migration of native aquatic and riparian species.	How are aquatic benthic macroinvertebrate communities indicating stream ecosystem integrity is being maintained in high quality waters or improved in degraded waters?	<ul style="list-style-type: none"> • Benthic macroinvertebrate diversity, species composition; and related metrics
FS02	TERR-OAK-DC 01 Oak trees, snags, and down logs provide habitat for a variety of wildlife species. Oak snags and live trees with dead limbs, hollow boles, and cavities provide shelter, and resting and nesting habitat. Acorns are plentiful, provide food for wildlife, and are available for traditional cultural uses.	What is the status and trend of black oak trees?	<ul style="list-style-type: none"> • Extent of large trees • Regeneration • Incidents of mortality and disease

Ecological Conditions for At-risk Species

For select at-risk species, a select set of ecological conditions, including habitat, is monitored. The selected ecological conditions are necessary to provide for diversity of plant and animal communities and contribute to the recovery of, conserve, or maintain the viability of at risk species within the plan area. At-risk species include federally recognized threatened, endangered, proposed, and candidate species plus the species of conservation concern identified for the forest. Only a select set of ecological conditions is monitored for select at-risk species and may include characteristics at both the ecosystem and species-specific levels of terrestrial, riparian, or aquatic ecosystems.

Table 16. Monitoring questions and associated indicators that evaluate ecological conditions for select at-risk species

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
AR01	<p>SPEC-FW-DC-02 Ecological conditions for at-risk species support self-sustaining populations within the inherent capabilities of the plan area, including minimizing impacts from threats (such as disease and other site-specific threats). Ecological conditions provide habitat conditions that contribute to the survival, recovery, and delisting of species under the Endangered Species Act; preclude the need for listing new species; and improve conditions for species of conservation concern.</p>	<p>Do stream temperatures support persistence of native at-risk aquatic species in select reaches?</p>	<p>Water temperature (maximum summer stream temperature; average daily stream temperatures; maximum daily average stream temperature during summer and fall for fall spawners; maximum and minimum winter stream temperatures.)</p>

Visitor Use, Visitor Satisfaction, and Progress toward Meeting Recreation Objectives

The plan monitoring program includes monitoring questions and associated indicators that address the status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.

Table 17. Monitoring questions and associated indicators that evaluate visitor use, visitor satisfaction, and progress toward meeting recreation objectives

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
VU01	<p>REC-FW-DC-03 Recreation opportunities provide a high level of visitor satisfaction. The range of recreation activities contribute to social and economic sustainability of local communities.</p>	<p>What are the trends in visitor use and satisfaction?</p>	<ul style="list-style-type: none"> • Visitor use and satisfaction (National Visitor Use Monitoring survey) • Visitor recreational activity by type • Visitor demographics
VU02	<p>REC-FW-DC-13 A sustainable system of trails provides access to destinations, provides for opportunities that connect to a larger trail system, provides linkages from local communities to the national forest, and is planned, designed and managed to be compatible with other resources.</p> <p>REC-FW-OBJ-01 Within 15 years of plan approval, maintain to standard 25 percent of the national forest's designated trail systems.</p>	<p>What percentage of the inventoried motorized and non-motorized trail system is maintained to standard?</p>	<ul style="list-style-type: none"> • Miles of trail maintained to standard. • Inventoried motorized and nonmotorized trail system miles

Climate Change and Other Stressors

The plan monitoring program includes monitoring questions and associated indicators to determine whether there are measurable changes on the plan area resulting from climate change and other stressors.

Table 18. Monitoring questions and associated indicators that measure changes on the plan area resulting from climate change and other stressors

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
CC01	TERR-FW-DC-02 Vegetation structure and composition provide ecosystem resilience to climate change and other stressors including altered fire regimes, drought, and flooding in riparian systems.	How is the rate and distribution of tree mortality changing?	<ul style="list-style-type: none"> • Tree mortality across ecosystem types, by percent dead conifer, by area • Annual moisture deficit map
CC02	FIRE-FW-DC-04 Wildland fires burn with a range of intensity, severity and frequency that allow ecosystems to function in a healthy and sustainable manner. Wildland fire is understood as a necessary process, integral to the sustainability of fire-adapted ecosystems and is used as an effective restoration tool (see TERR-FW-DC related to fire). The landscape is strategically compartmentalized by treated areas and natural features, which facilitates use of prescribed fire and wildfire to meet resource objectives for protecting values and resources.	How are fire regimes changing compared to the desired conditions and the natural range of variation?	<ul style="list-style-type: none"> • Fire return interval departure • Number and acres of fire by ecosystem type • Fire severity by ecosystem type

Progress toward Meeting the Desired Conditions, Objectives, or other Plan Components

Progress toward meeting desired conditions, objectives, or other plan components that do not fall under one of the other eight required items are included in the monitoring program. Specifically, the plan monitoring program must contain one or more questions and associated indicators addressing the plan contributions to communities, social and economic sustainability of communities, multiple use management in the plan area, or progress toward meeting the desired conditions and objectives related to social and economic sustainability.

Table 19. Monitoring questions and associated indicators that evaluate progress toward meeting desired conditions not addressed elsewhere in the monitoring program, particularly those related to social and economic sustainability of communities

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
PC01	<p>VIPS-FW-DC-01 The Sierra has a network of dependable partners and volunteers who provide additional capacity to effectively and efficiently meet plan desired conditions and deliver services to the public.</p> <p>WTR-FW-GOAL-02 Take a landscape- or watershed-scale approach to restoring aquatic and riparian ecosystems, integrating with recreation, range management, fuels, and vegetation management to efficiently use limited resources, including partnerships, and to effectively address climate change.</p> <p>REC-FW-GOAL-04 Promote effective communication with gateway communities to help foster partnerships, inspire volunteers, educate the public, and support stewardship that contributes to funding, implementation of projects, and long-term maintenance of facilities.</p>	How have costs trended in comparison with plan projections and what the primary influencers have been?	<ul style="list-style-type: none"> • Forest annual budget, supplemented by partnerships and other outside funding, combined outputs
PC02	<p>FIRE-FW-GOAL-01 Reduce fuel accumulations, help maintain and protect habitat for a variety of species, reduce smoke from larger fires, provide added protection for communities, and restore fire on the landscape. These actions are also an integral part of achieving sustainable recreation, particularly by maintaining scenic attractiveness, integrity, and character.</p>	What management actions are contributing to the achievement of desired conditions relating to fire regimes?	<ul style="list-style-type: none"> • Acres of fires managed for resource objectives by ecosystem type • Acres of fire by objective within each management zone • Acres of prescribed fire • Acres of mechanical treatment
PC03	<p>LOC-FW-DC-03 Forest uses such as recreation, forest products, carbon sequestration, power generation and water production are provided in an ecologically sustainable way that also contributes to economic and social sustainability in local communities.</p>	What are the economic contributions of forest-based recreation, forest products, carbon sequestration, power generation and water production?	<ul style="list-style-type: none"> • Conditions in forest-based sectors • Forest contributions

Productivity of the Land

This monitoring requirement comes from the National Forest Management Act requirement that there be research regarding the effects of timber management systems on the productivity of the land, and that such research is to be based on continuous monitoring and assessment in the field. Monitoring is focused on key ecosystem characteristics related to soils and soil productivity.

Table 20. Monitoring questions and associated indicators that evaluate soils and soil productivity

Code	Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators
PR01	WTR-FW-DC-04 Soil and vegetation functions in upland and riparian areas are sustained and resilient. Healthy soils provide the base for resilient landscapes and nutritive forage for browsing and grazing animals, and support timber production. Healthy upland and riparian areas support healthy fish and wildlife populations, enhance recreation opportunities, and maintain water quality.	How does soil disturbance differ from pre- and post- activity for timber management?	<ul style="list-style-type: none"> • Number of harvest units surveyed and percent that meet the soil quality standards post-harvest

Appendices

Appendix A: Maps

Appendix B: Proposed and Possible Actions

Appendix C: A Renewed Partnership Focus for the Sierra National Forest

Appendix D: Management Strategies for Resolving Recreation Resource Conflicts

Appendix E: Timber Suitability and Management

Appendix F: Aquatic and Riparian Conservation Strategy

Appendix A: Maps

Lands of Specific Character

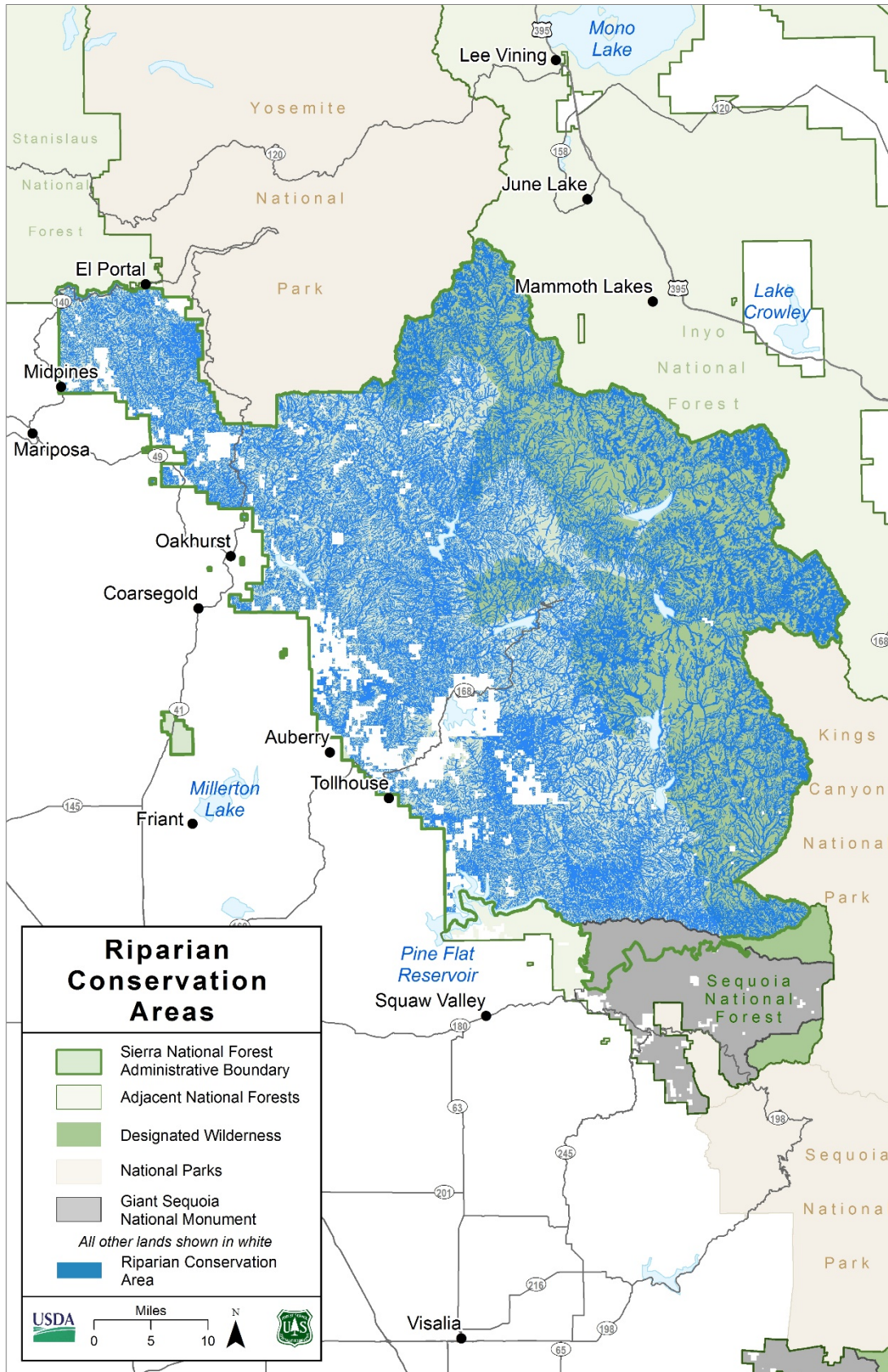


Figure 11. Riparian conservation areas

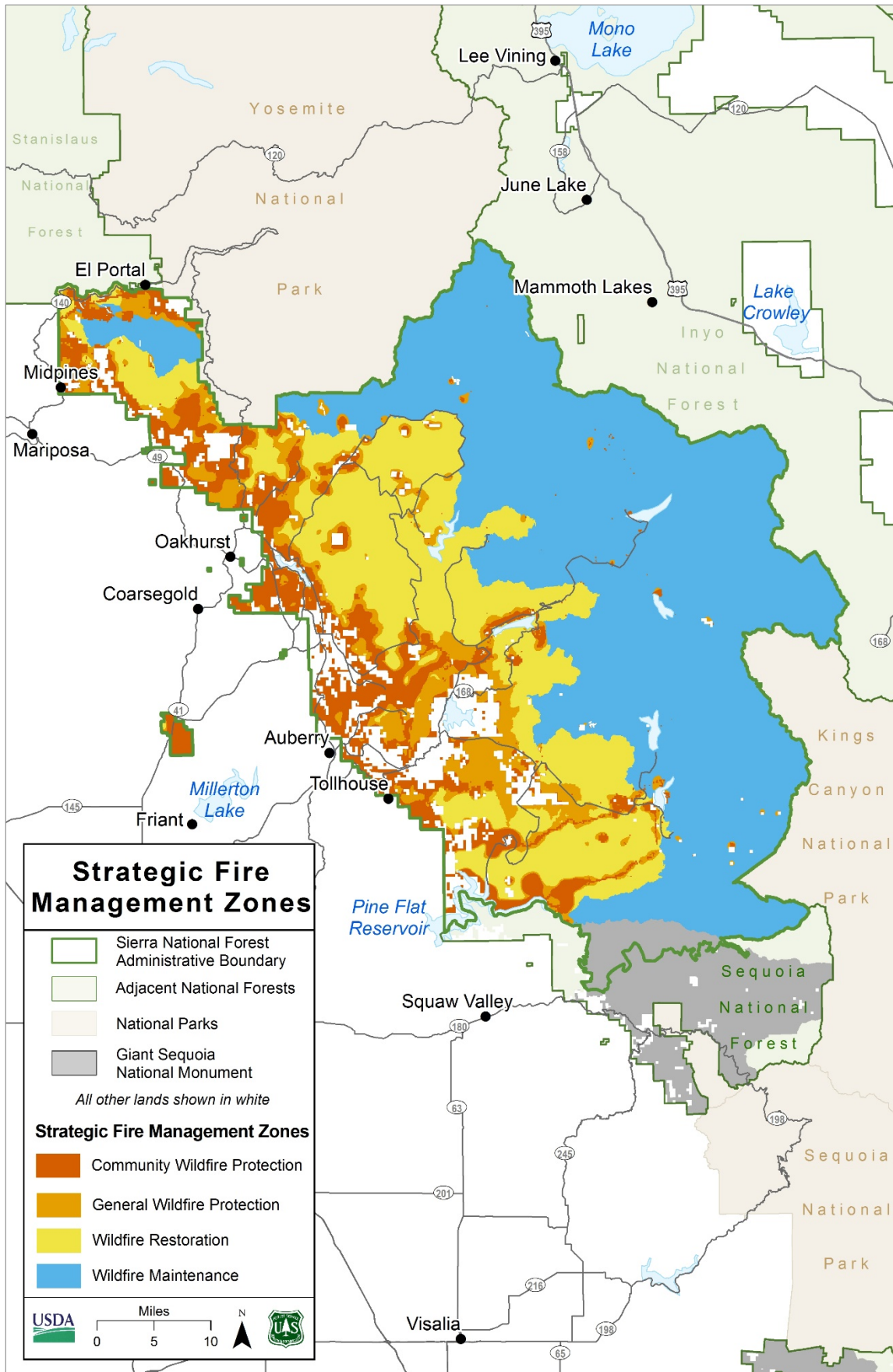


Figure 12. Strategic fire management zones

Management Areas

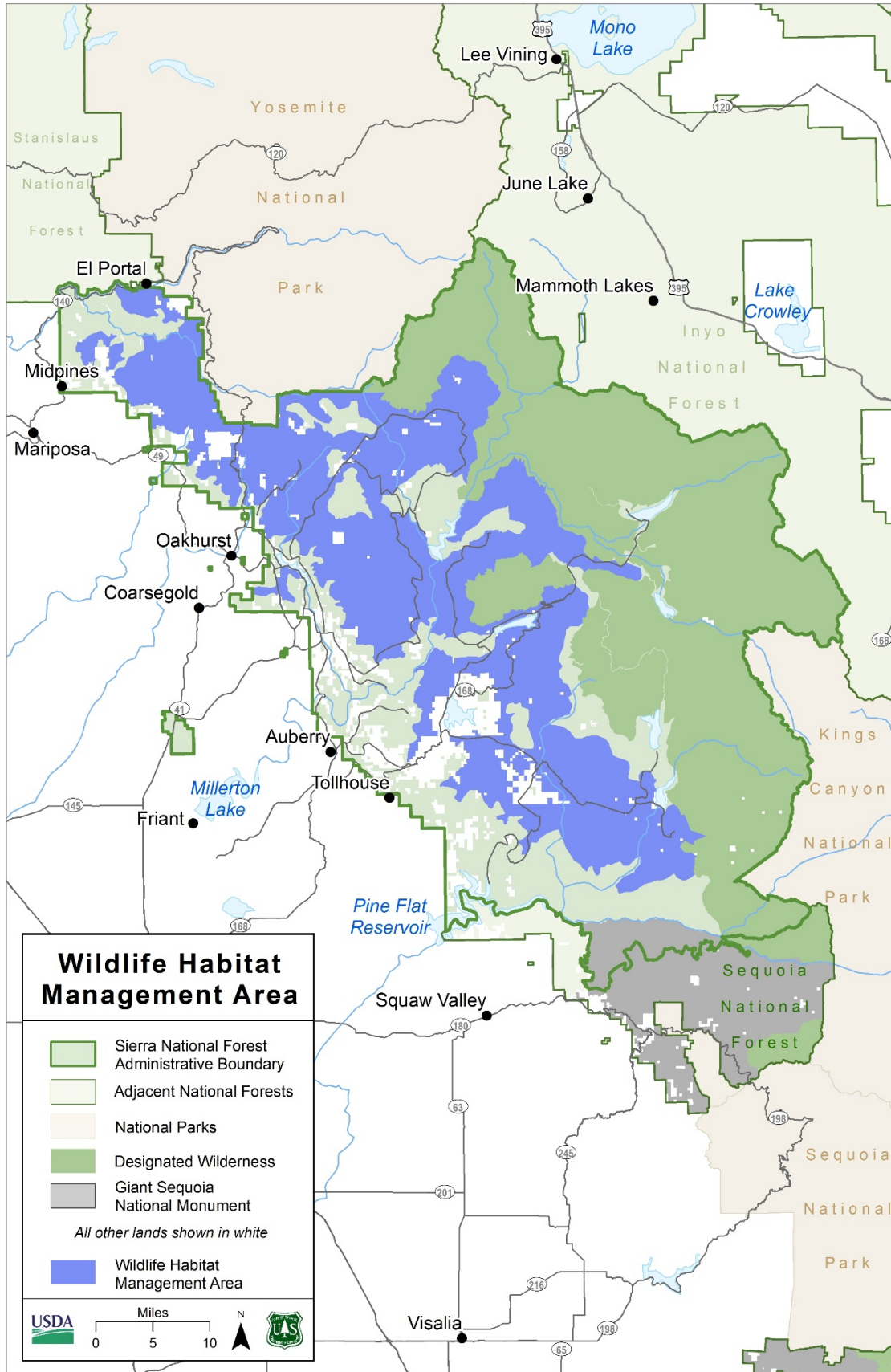


Figure 13. Wildlife habitat management areas

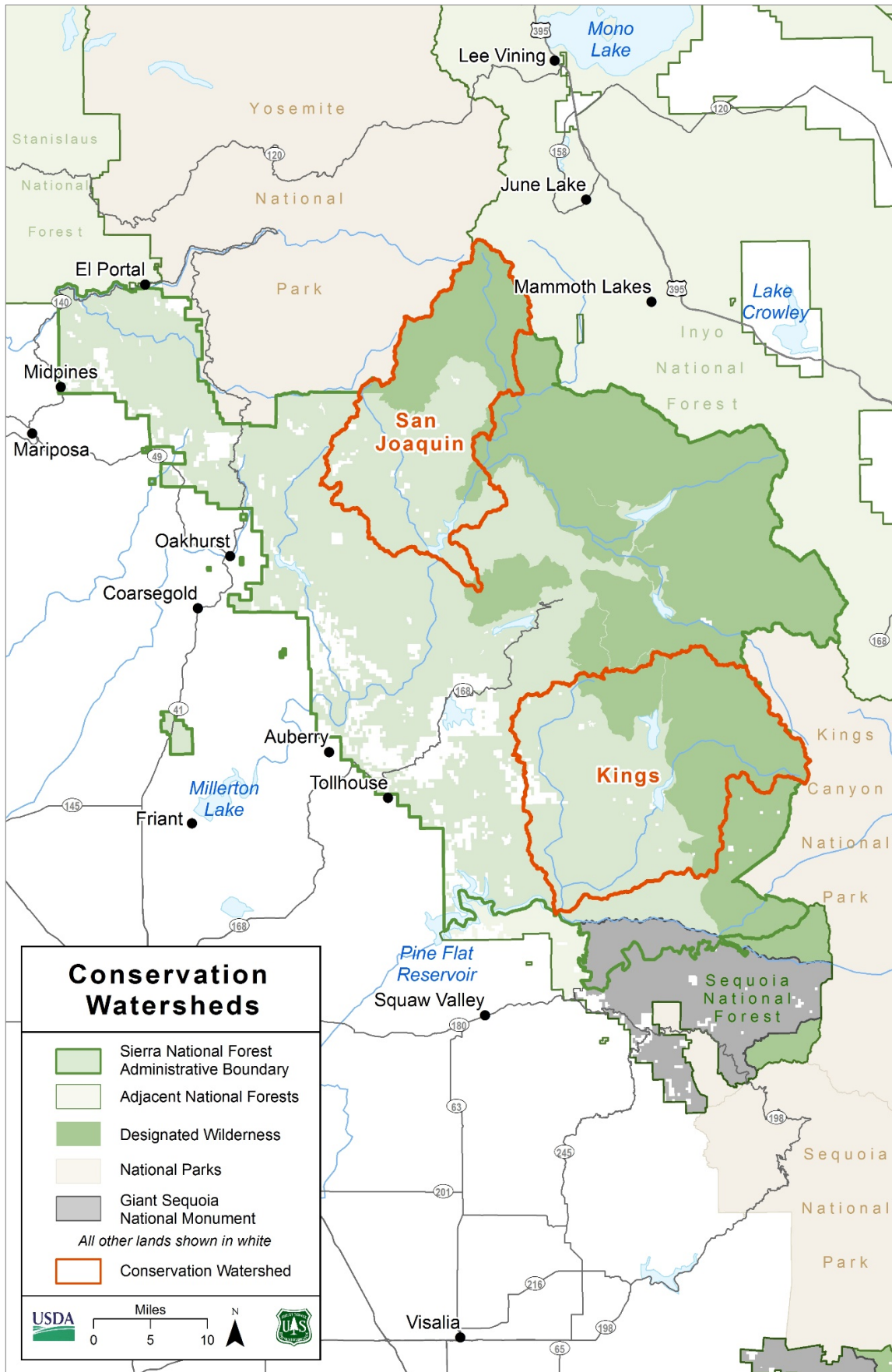


Figure 14. Conservation watersheds

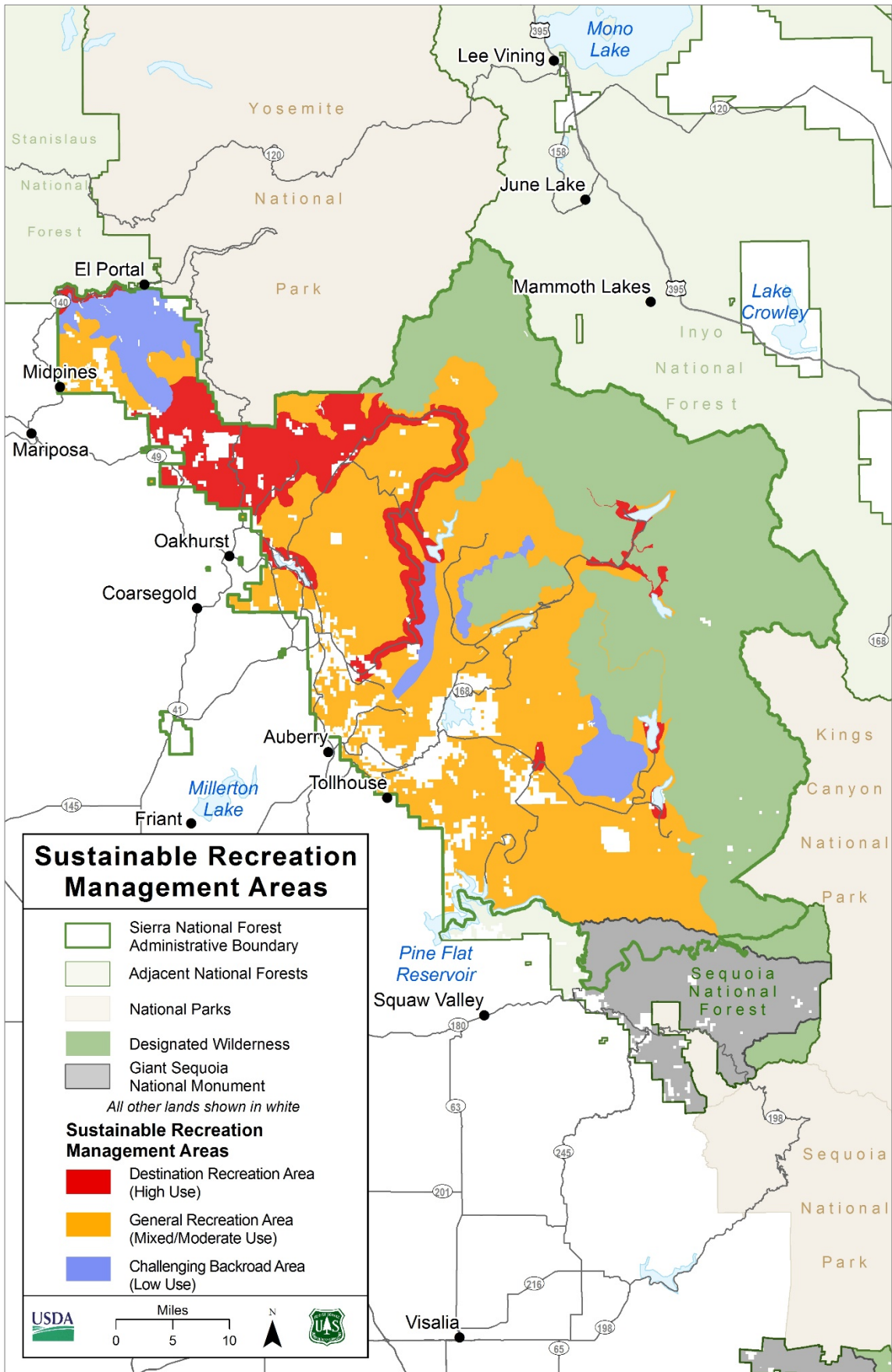


Figure 15. Sustainable recreation management areas

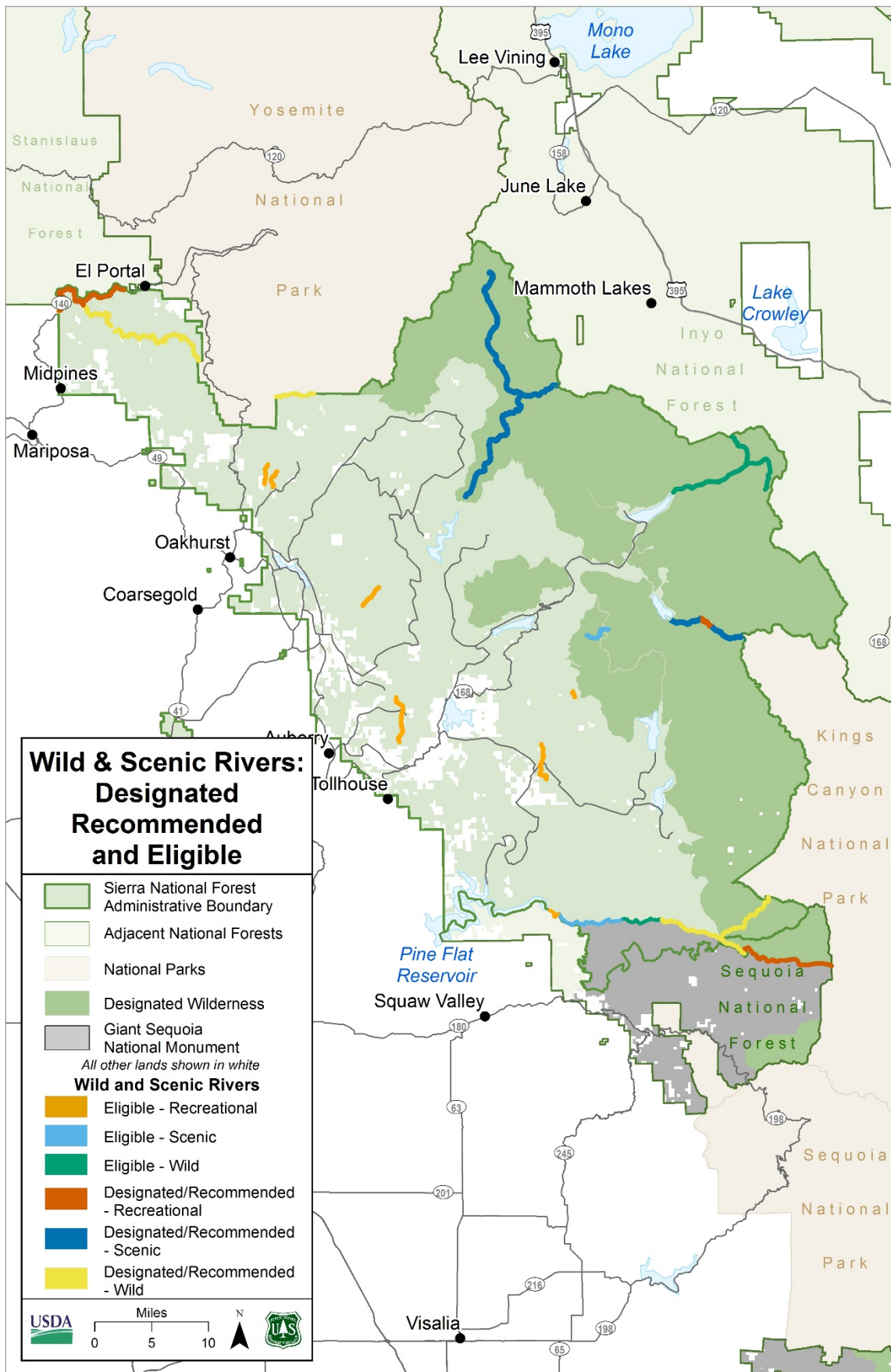


Figure 16. Designated, recommended, and eligible wild and scenic rivers

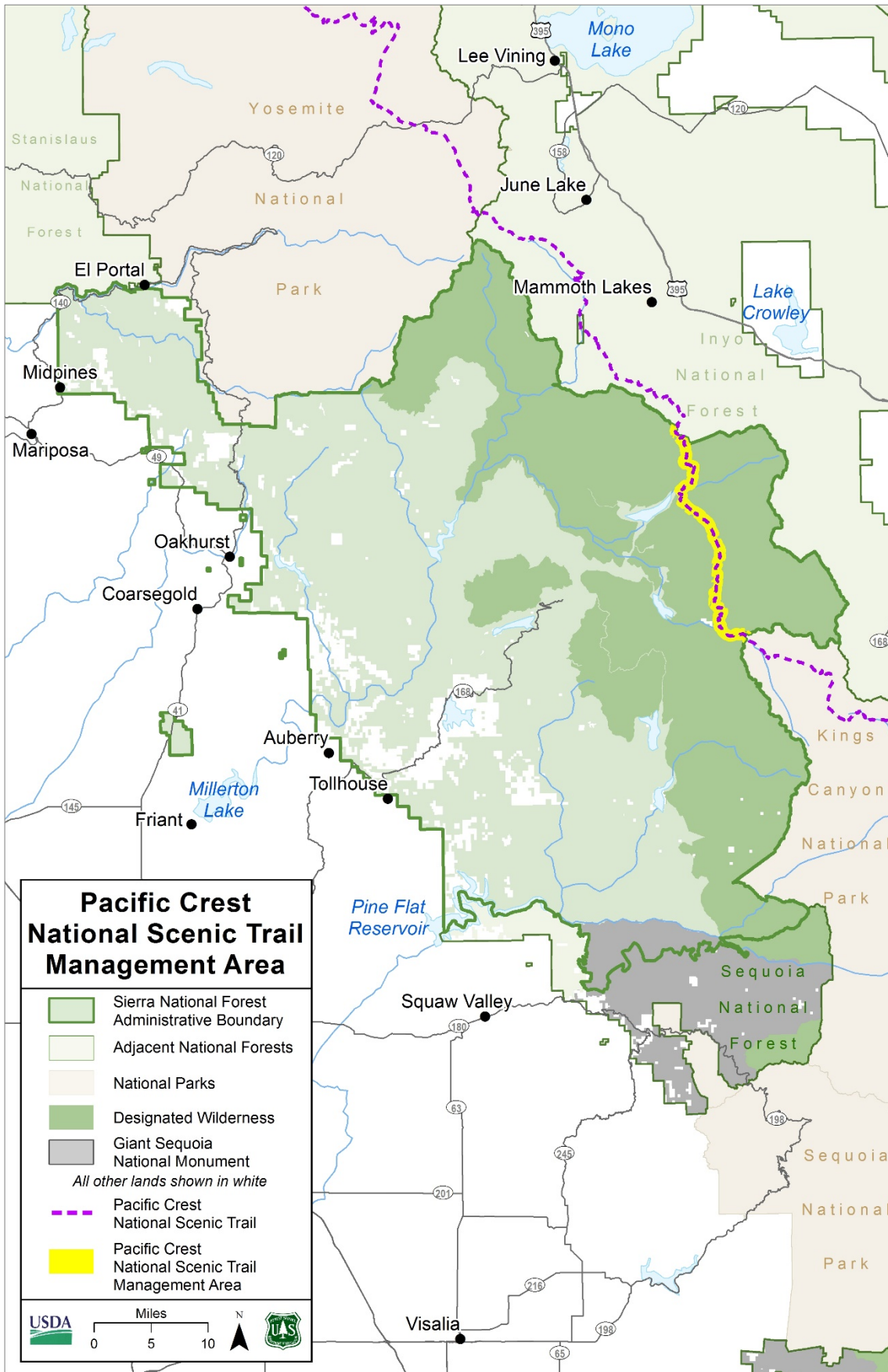


Figure 17. Pacific Crest National Scenic Trail management area

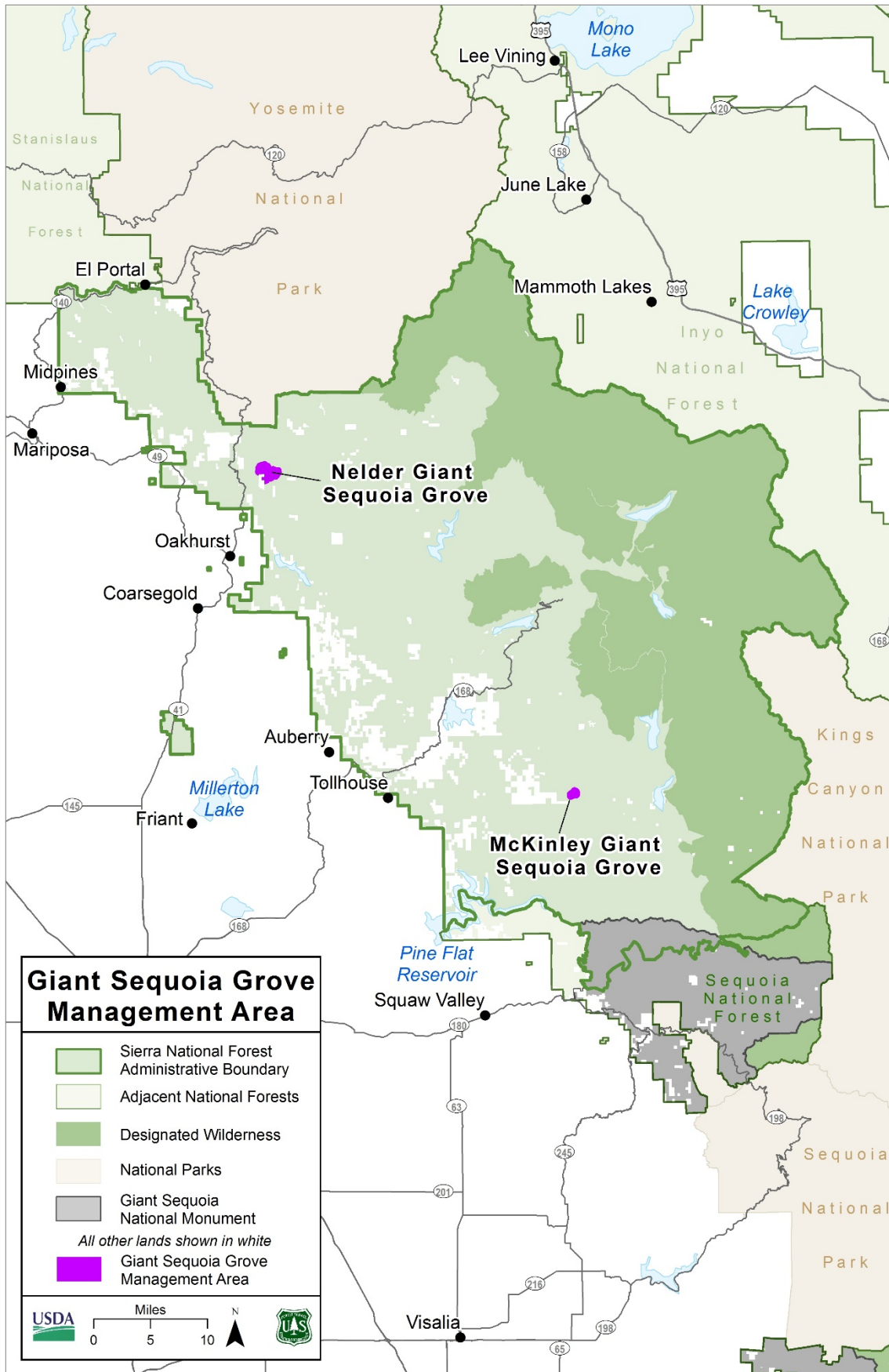


Figure 18. McKinley and Nelder Giant Sequoia Groves

Designated Areas

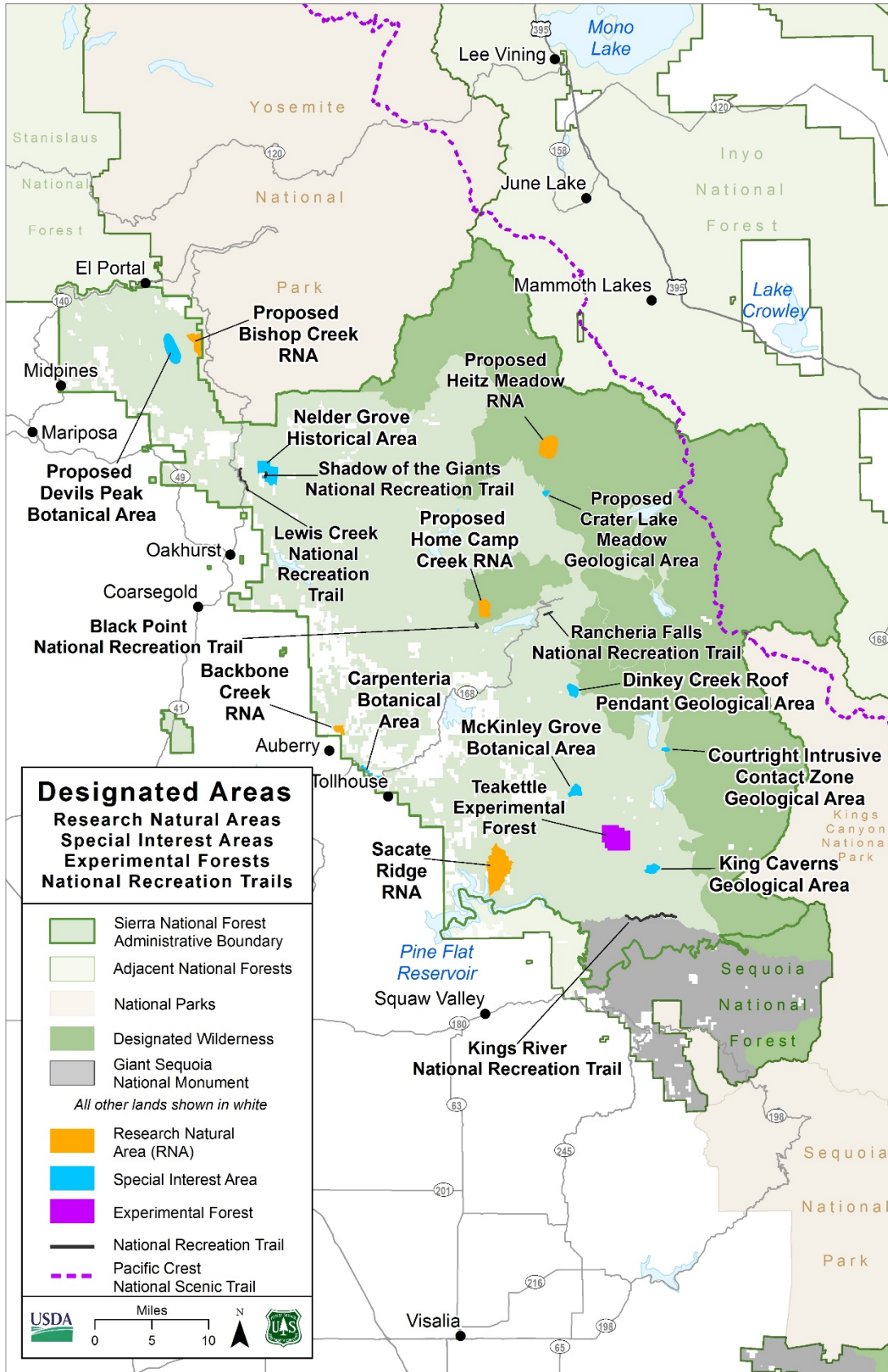


Figure 19. Designated research natural areas, special interest areas, experimental forest and national recreation trails

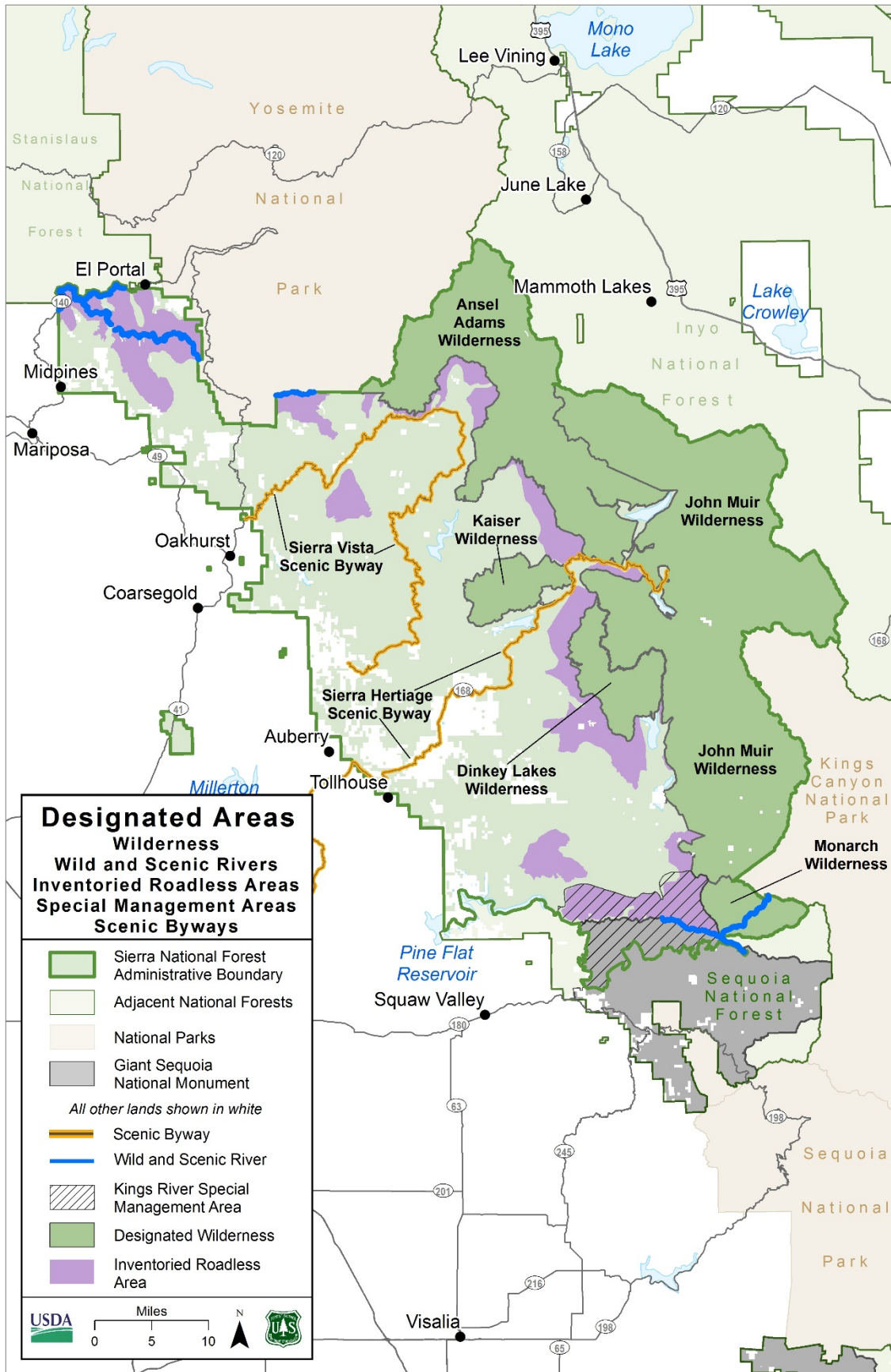


Figure 20. Congressionally designated wilderness, scenic byways, national monument, special management areas, wild and scenic rivers, and inventoried roadless areas

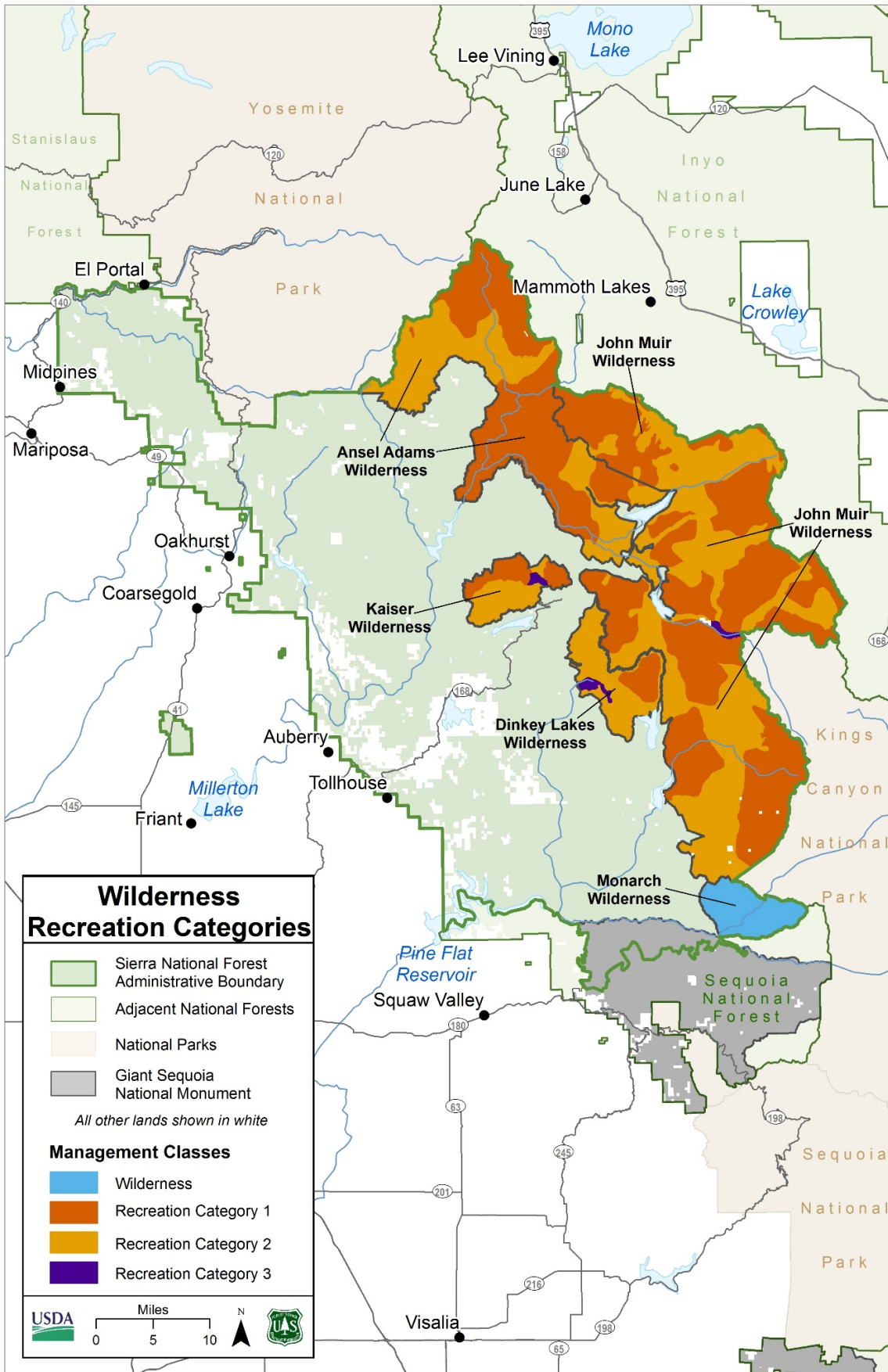


Figure 21. Wilderness recreation categories

Recreation Opportunity Spectrum

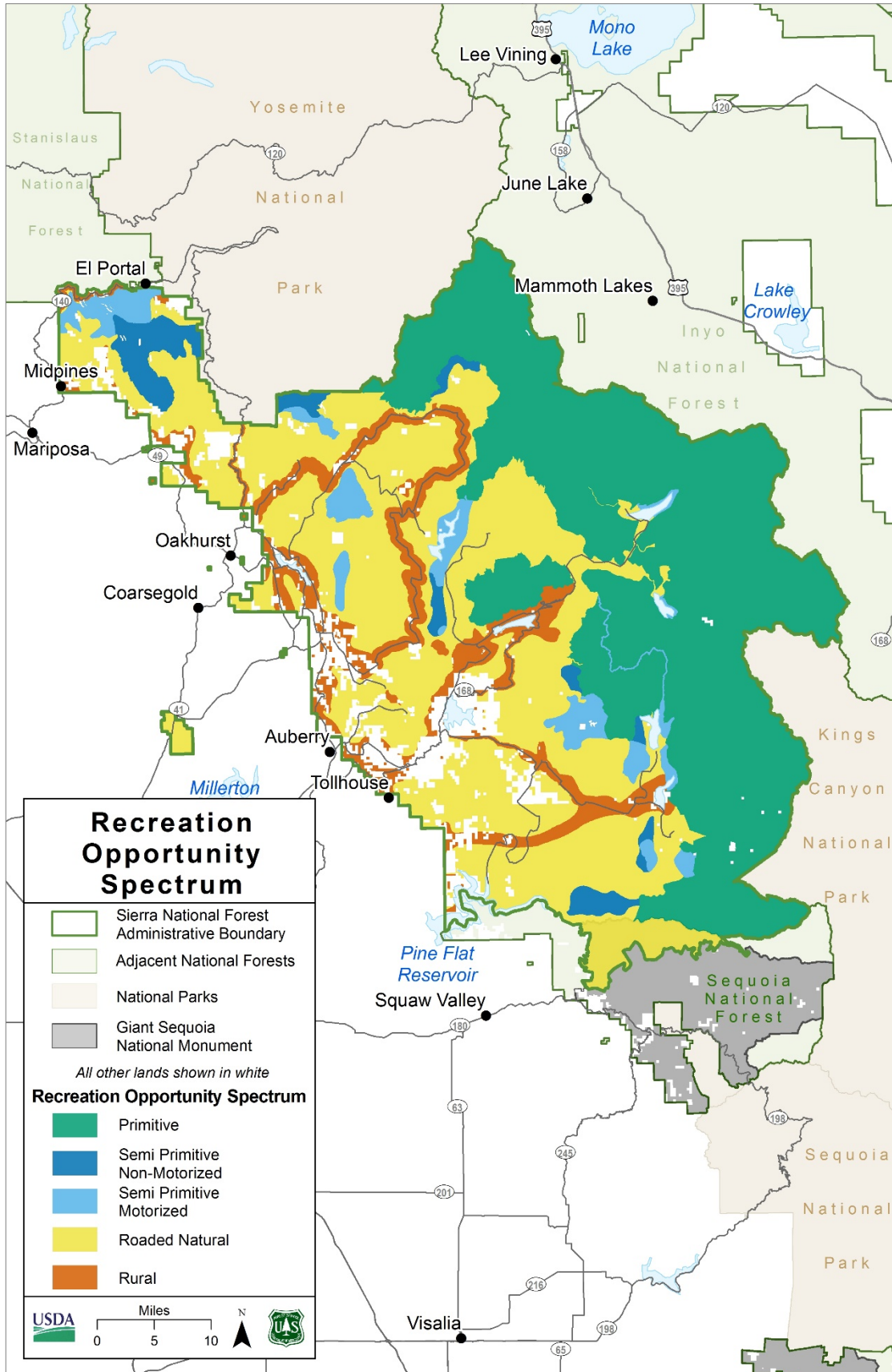


Figure 22. Recreation opportunity spectrum classes

Scenic Integrity Objectives

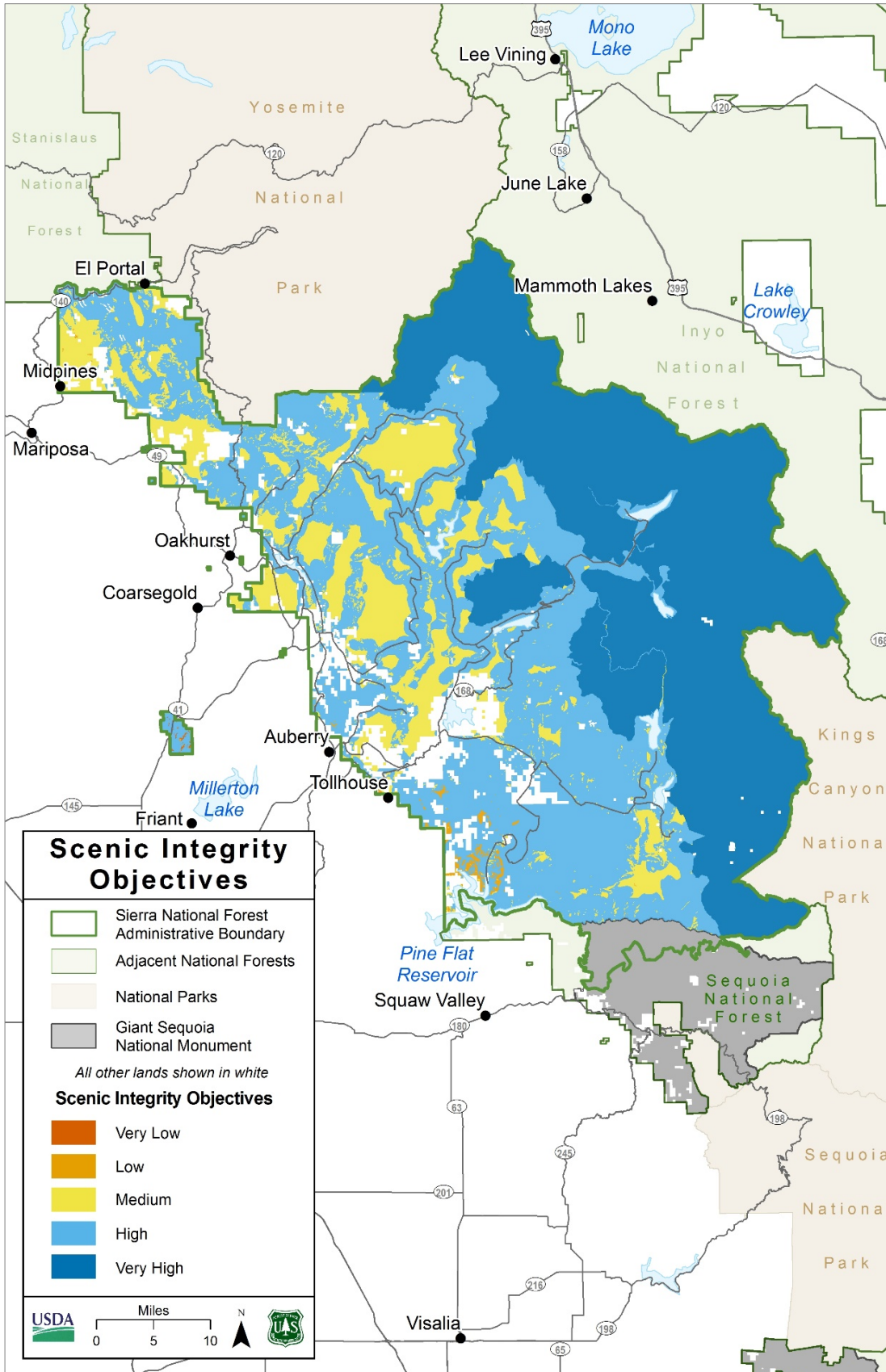


Figure 23. Scenic integrity objectives

Appendix B: Proposed and Possible Actions

Introduction

This appendix describes proposed and probable activities that may take place on the Sierra National Forest at the project or activity level to help maintain existing conditions or achieve the desired conditions described in the plan. Included are items such as program strategies; inventories, assessments, resource analyses and other planning needs; and ongoing work with partners and cooperating agencies anticipated during the next 3 to 5 years.

The listed proposed and probable management practices are neither intended to be all-inclusive, nor intended to be decisions, but simply projections of what actions may take place in the future. A plan amendment is not required to change or modify any proposed and possible actions. The list of these actions can be updated at any time through an administrative correction of the plan. More information may be found under plan objectives and management approaches.

Air

- Continue participation in interagency groups, councils and committees focused on cooperation and coordination among land management agencies and air quality regulators in mitigations of potential air quality impacts from prescribed fire and wildfires.

Water, Soils, and Watershed

- Plan and implement restoration actions in priority watersheds. Implement best management practices on all projects and continue to conduct best management practices monitoring to ensure water quality objectives are being met.
- Reconstruct or restore riparian function to springs identified as not in proper functioning condition.
- Restore nonfunctioning or functioning-at-risk riparian areas so they are in or moving toward proper functioning condition.
- Evaluate fens (peatlands) using the regional fen proper functioning condition protocol 12; determine and implement actions to restore fens and sustain peat formation if necessary.
- Implement actions on meadows, riparian habitat, and stream habitat that maintain or restore structure, composition or function of habitat for fisheries and other aquatic species in the Greys Mountain, Whisky Ridge, Bald Mountain, Eastfork, and Exchequer Project areas.

Terrestrial Ecosystems

- Restore aspen stands that are departed from desired conditions where feasible.
- Increase the pace and scale of ecological restoration on the national forest through potentially larger scale planning and implementation processes; include thinning forests to reduce fuels and uncharacteristic wildfire, insects, and disease risk, while producing commercial timber and biomass material.
- Continue commitment to participating in collaborative planning processes to ensure that restoration strategies are science-based and reflect diverse interests.

- Work cooperatively with researchers to promote ecological studies relevant to forest management at the Teakettle Experimental Forest.
- Work cooperatively with researchers and other interested parties who have knowledge of local ecological conditions, past and present, and expertise in appropriate restoration measures.
- Maintain or restore habitat connectivity where appropriate to improve adaptive capacity of native plants and animals. Collaborate with partners to establish priority locations for maintaining and restoring habitat connectivity.
- In subalpine and alpine ecosystems, educate the public about the unique properties of these ecosystems and the potential impacts of climate change, inappropriate recreation use, and other stressors.

Aquatic and Riparian Ecosystems

- Implement restoration actions to maintain, enhance or improve conditions on 3 to 5 meadows in the Greys Mountain, Whiskey Ridge, Bald Mountain, Eastfork and Exchequer Project areas.
- Implement actions on stream habitat that maintain or restore structure, composition or function of habitat for fisheries and other aquatic species in the Greys Mountain, Whiskey Ridge, Bald Mountain, Eastfork and Exchequer Project areas.
- Eliminate or mitigate the high priority barriers to aquatic organism passage.
- Restore the structure and composition of riparian habitat, with emphasis on areas where riparian areas are most at risk from large-scale high-intensity fire, past fire exclusion or climate change in the Greys Mountain, Whiskey Ridge, Bald Mountain, Eastfork and Exchequer Project Areas.
- Reconstruct or restore riparian function to springs identified as not in proper functioning condition.
- Restore nonfunctioning or functioning-at-risk riparian areas so they are in or moving toward proper functioning condition.
- Evaluate fens (peatlands) using the regional fen proper functioning condition protocol;¹² determine and implement actions to restore fens and sustain peat formation if necessary.

Animal and Plant Species

- Restore, improve or maintain terrestrial and aquatic wildlife habitat for native trout, amphibians, butterflies, and rare plants.

Invasive Species

- Maintain a current inventory of invasive exotic species on National Forest System lands, access roads, and trails.
- Continue invasive weed treatments in high priority areas.

¹² Weixelman, Dave A, Cooper David J. 2009. Assessing proper functioning condition for fen areas in the Sierra Nevada and Southern Cascade Ranges in California, a user guide. Gen. Tech. Rep. R5-TP-028. Vallejo, CA. U.S. Department of Agriculture, Forest Service, Pacific Southwest Region, 42 p.

Fire

- Implement treatments to reduce fire hazards to communities and the national forest. Assess new wildfire starts for opportunities to manage wildfires to meet resource objectives. Implement other activities that facilitate and maximize opportunities to manage wildfires to meet resource objectives.
- Coordinate access for initial attack and suppression activities with responsible jurisdictions to reduce response times and address public and firefighter safety.
- Participate in the development and implementation of community wildfire protection plans to promote public safety and to reduce the risk of wildfire on lands outside the national forest.
- Coordinate the fire prevention program with local and State agencies across jurisdictions supporting a unified message. Target audiences include local residents and out-of-area national forest users.
- Develop a forestwide prescribed fire implementation plan.

Timber and Other Forest Products

- Ensure the sustainability of special forest products through establishing maximum harvest levels for commercial sales and personal use permits.
- Accomplish vegetation and fuels management restoration projects using a mix of contracting practices including stewardship contracts, timber sales, service contracts, partnership agreements, and other methods.
- Provide forest products that will sustain opportunities for local workforces and support development and maintenance of existing local and regional forest products infrastructure.
- Information on the planned timber sale program, including anticipated harvest levels and vegetation management practices, is contained in appendix E.

Range

- Implement the Sierra's revised Rescissions Act Schedule for grazing allotment environmental analysis to update allotment management plans accordingly.
- Secure and maintain stock water rights for proposed spring or water developments.

Sustainable Recreation

- Provide visitors with recreation opportunities in a variety of sustainable recreation settings, from primitive to highly developed areas, focusing agency resources on settings with high niche conformance.
- Improve and protect riparian areas and meadows by establishing effective setbacks for recreation activities that have impacted or have the potential to impact resources.
- Continue to implement new strategies focusing on high use areas to reduce the human impact on recreation settings from recreation use such as reducing litter, soil compaction, erosion and vegetation removal, and improving sanitation.

- Protect and enhance natural resources and natural amenities of recreation settings by engaging the public and recreation user groups in responsible recreation use and natural resource stewardship activities.
- Outreach to youth and underrepresented groups, as well as traditional groups, to help manage the natural amenities of recreation settings and to educate peers and national forest visitors about resource stewardship.
- Complete updates and changes to the motor vehicle use map to achieve forest plan desired conditions.
- Improve facilities' operating efficiency and sustainability through new construction and repairs. Consider energy efficiency through the implementation of recycled or renewable resources which produce a smaller carbon footprint.

Scenery

- Rehabilitate areas that do not meet or exceed their desired scenic integrity objective.
- In all vegetation treatment and fuels reduction projects, meet the established scenic integrity objective and manage for high scenic stability through actions that will enhance and protect desired scenic attributes.
- Cooperate with other entities, such as California Department of Transportation, to maintain or create scenic vistas to meet the needs of the public and improve scenery in areas of high public concern.
- Use interpretive signs and exhibits to educate the public of the importance of fire in an ecosystem and in achieving desired scenic conditions.

Tribal Relations and Uses

- Continue tribal consultation on projects and needs as they arise.
- Jointly develop and implement memoranda of agreements and memoranda of understandings between the national forest and consulting American Indian Tribes, to guide consultation processes and reflect the Tribes' particular perspectives and interests.
- Develop partnerships and agreements with interested tribal governments for the Tribes to provide site stewardship services on the national forest.
- Participate in regular meetings and tribal forums with Tribes to understand their needs, exchange ideas and promote mutually beneficial projects, goals and objectives.
- Maintain consistency on already established special forest products collection policies and tribal firewood programs with local Tribes.
- Create volunteer opportunities and promote potential employment or contracting opportunities for tribal communities.

Cultural Resources

- Develop at least one agreement with a university, college, or other educational institution to provide field school opportunities for students to conduct research, as well as to identify and record cultural resources on the forest.

- Outreach to State, county and local governments to develop partnerships and agreements that will incorporate appropriate national forest-based cultural resources, interpretative services, and heritage education into county and local community plans for heritage tourism.
- Develop a plan that identifies the process to convert appropriate historic buildings into the recreation rental program.
- Engage youth groups, veteran's groups, and non-profit organizations with educational and occupational opportunities that provide demonstrable benefit to the Sierra National Forest's historic preservation program.

Geology and Minerals

- Coordinate with the Bureau of Land Management and other agencies to properly process applications for mineral entry and mineral operations on the forest.
- Rehabilitate abandoned mine lands that are no longer in use.

Energy

- Manage hydroelectric generation under Federal Energy Regulatory Commission (FERC) licenses and to provide recreation for forest visitors.

Infrastructure

- Update the facilities master plan to reflect quarter's occupancy rates and the National reduced footprint initiative.
- Implement the Southern California Edison Relicensing Transportation Plan.
- Complete reconstruction of the Sierra Vista National Scenic Byway.
- Collaborate with watershed and aquatic staff to inventory road culverts and enter into infrastructure database.
- Support the Pacific Southwest Region's implementation of the Federal Lands Transportation Program throughout the region.
- Maximize use of students through agreements with Fresno State and internships to accomplish engineering work for the national forest and the region.
- Leverage appropriated funds in partnership with the State Off-highway Vehicle Commission to do road work benefiting the off-highway vehicle community.

Lands

- Acquire right-of-way agreements for public and Forest Service use.

Special Uses

- Monitor permits for existing special use activities on the national forest.
- Prioritize reissuance of existing expired permits in priority watersheds.

- Develop a plan to enhance the Sierra National Forest's commercial filming permitting process.
- Complete needs assessments for outfitter and guiding permits in both wilderness and nonwilderness areas.
- Prioritize utility companies' responsibilities for vegetation removal and infrastructure maintenance within power line rights-of-way to meet national standards.
- Complete updates to communication site plans for existing and new communication sites.

Designated Areas

Wilderness

- Restore trails, areas, and sites that are causing unacceptable resource impacts.
- Implement the Sierra National Forest wilderness education plan and review it for effectiveness every three years.

Wild and Scenic Rivers

- Implement comprehensive river management plans for any newly designated wild and scenic river within 5 years of designation.

Scenic Byways

- Coordinate activities and design of byway facilities with the appropriate byway association and byway plan.

Appendix C: A Renewed Partnership Focus for the Sierra National Forest

Partnerships in land stewardship reflect a growing and important trend, the joining of passion and resources by committed citizens, organizations and government agencies to achieve social, economic and ecological goals. The U.S. Forest Service has worked with partners throughout its more than 100-year history. But the challenges of land management have grown more complex, and the needs of the public more varied. The American people today are voicing their strong desire to volunteer and participate in the stewardship of natural resources and in the decisions that affect their communities. The Forest Service has responded by developing partnership strategies at the national (<http://www.fs.usda.gov/prc>) and regional (<http://www.fs.usda.gov/main/r5/workingtogether>) levels.

The mission of the Forest Service is to “sustain the health, diversity, and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations.” Partnerships are essential to carrying out that mission today. Fortunately, there are hundreds of organizations in California whose missions overlap with ours in some way, creating the opportunity to work together toward bigger, better outcomes than each can achieve on its own.

The Sierra National Forest recognizes the value of continuing to develop effective partnerships, wherein we invite public participation, embrace stakeholder proposals, and successfully leverage our resources by working together to achieve the desired conditions set forth in the forest plan.

Creating a Partnership Culture

The forest supervisor on the Sierra National Forest responds to the needs of a varied public by empowering employees and communities of place, interest, and culture to create and sustain successful partnerships. The forest supervisor and national forest staff have established the following partnership goals to accomplish the Forest Service mission, implementing the forest plan, and building a strong and lasting community of stewardship on the Sierra National Forest:

- Through partnership, sustain the health, diversity and productivity of the Sierra National Forest.
- Build community support for, and understanding of, the Sierra National Forest.
- Enhance opportunities to connect people to the land, especially in urban areas and of diverse cultures.
- Expand partnerships with other Federal, State, and local government agencies, as well as associations, non-government organizations, and other community groups, to leverage information and resources for mutual benefit.
- Foster partnerships dealing with science associated with forest health.
- Create more “citizen stewards” for the Sierra National Forest through volunteerism.
- Support the ongoing efforts of current partnerships.
- Develop new partnerships focused on management of the land (e.g., tree planting).
- Build and enhance partnerships to protect tribal sites and interpret cultural assets.

Accomplishing these goals will require new and innovative methods as well as the continuation of investment in ongoing successful partnership efforts. The purpose of this strategy is to outline

an iterative process for building and sustaining a strong partnership culture for the Forest. The strategy includes the following components: a method for determining the forest capacity for working in partnership; best practices for building and sustaining new partnerships; and steps for ensuring effective outreach to nontraditional partners

Forest Capacity for Working in Partnership

The National Partnership Office of the U.S. Forest Service has designed a partnership capacity assessment tool (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd493263.pdf) to help Forest Service units assess, sustain and improve their abilities to work with partners and continue the Forest Service's long history of partnership and collaboration in land stewardship.

What is the Partnership Capacity Assessment Tool?

The "partnership capacity assessment tool" is essentially a group exercise to reflect on experiences and attitudes about partnerships and collaboration. The tool asks the group to score itself on a series of questions about partnership opportunities, goals, resources, procedures, incentives, barriers, skills and relationships. The group then uses these scores to chart strengths, analyze positive and negative factors that contribute to partnership capacity, and identify actions to sustain and grow capacity.

Who Should Use the Assessment Tool?

The tool is used by the Sierra National Forest in conjunction with communities of place, interest, and culture, who care about the uses and resources within the national forest and who will benefit from completing the assessment. This tool is designed to generate open dialogue with partners and among staff. It is a useful starting point for assessing current partnership abilities and discussing how to maintain strengths or address needs. A community forum would be formed to use the assessment tool.

How Can the Assessment Tool Best Meet the Needs of the Forest?

The assessment tool provides the format for a community forum to assess partnership needs and develop priorities to meet those needs. Use of the assessment tool by Forest Service staff can help identify needed resources and changes to better position the Forest for successful accomplishment of goals through partnerships. Including partners in the process can help promote dialogue and improve relationships. However, the tool is not intended to assess the feasibility of or develop plans for specific partnership opportunities. These details will be identified during project-level planning.

How Long and Where Will the Assessment Take Place?

The community forum can expect to complete the assessment in one session lasting 3 to 4 hours. The investment of time will pay off by helping forest staff and potential partners to systematically identify needs and actions to meet those needs. Trained facilitators and recorders can be used to keep the process moving smoothly.

Best Practices for Building New Partnerships

Partnerships can be thought of as a type of alliance, where the complex interaction of business and interpersonal activities are essential to successfully achieving mutually beneficial goals. Key characteristics of successful interpersonal relationships include trust, communication, perspective taking, rapport building, and commitment. Partnerships are known to yield better results under

certain conditions¹³, for example: when each partner recognizes the need to have access to capabilities and competencies it cannot develop internally; or when a gradual and sustained approach is preferable in accessing resources, capabilities and competencies, as opposed to faster and shorter-term mechanisms such as contracting.

Keeping these conditions in mind, the following best practices are provided to assist national forest staff in the identification and development of new partners:

1. Identify the need for partnerships within the long-term strategies and desired condition of the forest
2. Define specific objectives of the partnership
3. Choose partners
4. Evaluate what to offer and what to receive in exchange
5. Define and act upon opportunities
6. Evaluate the effect on forest stakeholders
7. Determine each partner's resources and capabilities
8. Plan the integration
9. Create the partnership
10. Take action and achieve the objectives
11. Recognize and celebrate successes

Identify the need for partnerships

Strategic partnerships respond to various long-term strategies of the Sierra National Forest. For example, the Dinkey Landscape Restoration Project gives the Forest the opportunity to partner with various groups. The goal of this science-based ecological project is to protect the landscape for various endangered species through managing fire back into the landscape. This 10-year project has made many contributions to discerning how to successfully work with partners. As this example demonstrates, partnerships are important because of the extra resources they provide, and because they help enrich the information provided and help develop a sense of stewardship in all the partners involved.

Define specific objectives of the partnership

Three aspects of defining objectives are necessary for the success of the partnership:

1. The objective should be compared with the national forest's available resources and capabilities and with those that could be used. The partnership should bridge the gap of existing resources and capabilities to achieve the objectives. The assessment tool can assist in identifying where gaps occur regarding both the forest's capability to cultivate new partnerships and its resources to accomplish management goals alone.

¹³ Mockler, R.J. 1999. *Multinational Strategic Alliances*. John Wiley & Sons. 266 p.
O'Neill, B. (n.d.) Brian O'Neill's 21 partnership success factors. San Francisco, CA: Golden Gate National Parks. <http://www.nps.gov/partnerships/oneill.htm>

2. A clear consensus (internally) on why the agency cannot reach particular goals on its own, and why it must seek a partnership with an external organization, rather than internal development or via procurement.
3. Knowing where the partnership generates mutual advantages within the chain of value, and clarifying why each partner cannot develop these advantages internally.

Choose partners

The right partner in an alliance must have three principal features:¹⁴

1. The partner must have the resources and capabilities to help the national forest achieve its strategic goals, bringing to the partnership what is missing and which they are seeking.
2. The partner and national forest must share the same long-term goals for the partnership. Failure is inevitable if the goals are divergent.
3. The partner must not use the alliance to gain know-how, relationships with clients or suppliers, or technology without making contributions of equal strategic weight. Alliances are longer lasting and better when they are considered between partners with a reputation for trustworthiness.

Evaluate what to offer and what to receive in exchange

Reciprocity is a key component of building trust. Each partner should evaluate which capabilities are critical to the partnership, and then decide what the forest can offer to the others and what it can expect from them.

Define and act upon opportunities

Knowing the value of the opportunities that can be achieved with the alliance is an essential guide in negotiation, and subsequent management, of the partnership. Beyond the opportunities, it is also important to examine the possible risks.

Evaluate the effect on forest stakeholders

A key question to consider is, “How will stakeholders, including other partners, react to the partnership?”

Determine each partner’s resources and capabilities

Understanding a partner’s abilities and limitations is an important component in creating a successful partnership. A key question to consider is, “What resources and capabilities can the partners realistically bring to the partnership?”

Plan the integration

Develop a partnership business plan, which should:

1. Organize activities and functions
2. Define accounting procedures
3. Define procedures to resolve conflicts

¹⁴ Hill C., and G. Jones. 2000. *Strategic Management: an Integrated Approach*, 5th ed. Boston, MA: Houghton Mifflin Company.

4. Define the relationships between the partnership and the national forest, including duration and renewal process
5. Define the authorizing instrument for the partnership (e.g., memorandum of understanding) that will be appropriate to formalize the relationship

Create the partnership

Flexibility is integral to sustaining an effective partnership. Whatever the form of the partnership, some principles apply:

1. Each partner has its own goals that dictate the role of the partnership
2. The role of the partnership changes as internal and external conditions evolve
3. The relationship between the partners is quite dynamic
4. Evaluate the partnership for effectiveness in meeting mutual goals

Take action and achieve the objectives

For a partnership to last, both parties must find the partnership to be meaningful and to satisfy the established objectives.

Recognize and celebrate successes

Honor the efforts accomplished through the work of partnership. This recognizes the individuals involved and strengthens the relationship between partners.

Steps for Ensuring Effective Outreach and Communication with Nontraditional Partners and the Public

The diversity of people using and valuing the Sierra National Forest will continue to increase as the American population grows and becomes more diverse, and as international visitation increases. California's youth is more culturally diverse than any previous generation. Interpretation and outreach methods designed to connect users to the national forest need to communicate important resource issues, solicit commitment to conservation, and encourage appropriate behaviors. Use of the national forest by nontraditional user groups, especially Hispanics and Asians, is prevalent and growing.

To assure effective outreach occurs within this growing segment of potential national forest partners, metrics should be designed to monitor and evaluate success, adapting as necessary to continually broaden the circle of involvement. The following steps may be considered, as appropriate, in developing innovative partnerships:

- Translation of major documents (or summaries thereof), provision of translators at meetings, or other efforts as appropriate to ensure that limited English speakers gain understanding of potential partnership opportunities
- Provision of opportunities for limited English speakers to provide comments and actively engage in partnership opportunities
- Provision of opportunities for public participation through means other than written communication, such as personal interviews or use of audio or video recording devices to capture oral comments

- Use of different meeting sizes or formats, or variation on the type and number of media used; tailor communications to the particular community or population
- Use of locations and facilities that are local, convenient and accessible to disabled individuals, low-income and minority communities, and Native American Tribes
- Assistance to hearing-impaired or sight-impaired individuals

Appendix D: Management Strategies for Resolving Recreation Resource Conflicts

Management strategies can be applied to existing or new recreation sites and uses whenever a conflict between recreation uses or sensitive resources is detected. Sensitive resources include at-risk species and habitats, riparian habitats, soil and watersheds, heritage resources, and other resources.

Implementation of these actions would also take into consideration available funding and staffing. The actions and practices include the following:

1. Conservation Education

- Use information networks, including public service announcements, internet sites and links, and visitor guides and newsletters to communicate information regarding sensitive resources.
- Install and maintain appropriate multilingual information boards, interpretive panels and regulatory signs at developed sites and dispersed areas within sites of sensitive resources.
- Develop interpretive and environmental education programs about sensitive resources and habitats for the public, Forest Service personnel, concessionaires, other special-use authorization holders, and volunteers. Engage the services of special-use authorization holders that provide services to the public (such as concessionaires, organization camps, and outfitter guides) to assist in the development and delivery of these programs. Provide authorization holders with messages about sensitive resources and management issues so that they can use them to educate people. Ensure that the methods chosen do not result in unacceptable effects to sensitive resources. Coordinate efforts between national forests for maximum results and cost efficiencies. Use existing visitor centers where appropriate.
- De-emphasize the site or area and develop an information strategy to direct visitors to national forest recreation opportunities that do not affect sensitive resources.

2. Perimeter Control

- Modify visitor access to manage use. Install and maintain appropriate fencing or other barriers to protect sensitive resource areas. Limit the number of users at the site or area.
- Install and maintain appropriate multi-lingual informational, interpretive, and regulatory signing, in conjunction with perimeter controls, to engage national forest visitors with protection of sensitive resources at recreation sites and areas.

3. Presence

- Provide adequate management presence to ensure protection of sensitive resources. This presence could include Forest Service personnel, peer education, contractors, concessionaires, other permit holders, and volunteer support.

4. Direct Action

- Limit visitor use of recreation sites and areas through diurnal, seasonal or temporary closures during critical life cycle periods for affected at-risk species.

Appendix D. Management Strategies for Resolving Recreation Resource Conflicts

- Where visitor use is allowed, seek opportunities to proactively rehabilitate, design, reconstruct, rehabilitate and harden the site; locate new facilities and areas for redistributing human use away from sensitive resources.
- Where visitor use is restricted, limit or control use at developed recreation sites and areas through permit system (e.g., group campgrounds). When other actions are ineffective, enact and enforce forest orders to protect sensitive resource areas through use of seasonal or temporary closures of developed recreation sites and areas. Seek opportunities to proactively design and locate new facilities and areas for redistributing human use away from sensitive resources.
- Where visitor use is prohibited when seasonal or temporary closures are ineffective, enact and enforce forest orders to close recreation sites or areas. If monitoring and evaluation indicate that closure is ineffective, take steps to decommission facilities and permanently discontinue visitor use.

Appendix E: Timber Suitability and Management

This appendix provides information regarding timber management that is required to be in the forest plan, in addition to required plan components. This includes information on lands suitable for timber production, and other aspects of the planned timber sale program including anticipated timber harvest levels, vegetation management practices, and reforestation. Additional detail on methodology and assumptions on which this appendix is based may be found in appendix F to the Draft Environmental Impact Statement for the Revision of the Sequoia and Sierra National Forests Land Management Plans.

Determination of Suitability for Timber Production

Timber production is the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use (36 CFR 219.19). Timber production activities can contribute to social, economic, and ecological sustainability. Timber production may offset some or all of the costs of silvicultural treatments and other forest management activities that restore ecosystems to desired conditions, lower uncharacteristic fire and insect risk, increase understory plant diversity and abundance, and create employment opportunities.

The National Forest Management Act requires that the Forest Service determine the suitability of National Forest System lands for timber production and has specific requirements for timber suitability analysis in land management plans. Note that there is a distinction between timber harvest as a resource use (as in timber production) and timber harvest as a management tool to achieve desired conditions. Timber harvest on lands classified as not suitable for timber production may be used as a tool designed to achieve desired conditions.

Lands that *May* be Suitable for Timber Production

Identification of lands that *may be* (tentatively) suitable for timber production is the first step in the process of determining lands that are suitable for timber production. This preliminary classification is made prior to the consideration of objectives and desired conditions that are part of the forest plan revision process. It excludes National Forest System lands that are not suitable for timber production based on the following criteria:

- Timber production is prohibited by statute, executive order, regulation, or where the Secretary of Agriculture or the Chief of the Forest Service has withdrawn the land from timber production. Examples include designated wilderness areas, designated wild and scenic rivers, research natural areas and other designated areas where timber is specifically prohibited.
- Land that is not forested (nonforest), identified by having less than 10 percent occupation¹⁵ by conifer trees of any size or having a nonforest use like powerline clearings, residential or administrative sites, improved pasture, or other such features.

¹⁵ Ten percent occupation was represented using 10 percent canopy cover during analysis.

- Known environmental factors exist that preclude reasonable assurance that restocking can be achieved within five years of final regeneration harvest¹⁶.
- Technology to harvest timber is not currently available without causing irreversible damage.

National Forest System lands that remain after this initial screening are termed “lands that *may* be suitable for timber production.” Based on this initial suitability analysis, the Sierra National Forest has 380,116 acres that *may* be suitable for timber production. Table 21 shows timber suitability for the Sierra National Forest, and includes a row that reflects the land acreage that *may* be suitable for timber production.

Table 21. Sierra National Forest land suitable for timber production

Land Classification Category	Acres
A. Sierra National Forest System Land	1,316,192
B. Lands non suited for timber production due to legal or technical reasons (1+2+3+4)	936,076
1. Land withdrawn from timber production	734,390
2. Nonforested lands, or lands where adequate stocking is not assured	201,687
4. Lands where irreversible resource damage is likely	0
C. Lands that <i>may</i> be suitable for timber production (A minus B)	380,116
D. Lands where management objectives limit timber harvest (1+2+3)	238,490
1. Recommended wilderness areas	0
2. Eligible wild river segments	67
3. California spotted owl protected activity centers	52,136
4. Riparian conservation areas	216,335
E. Lands <u>not suitable</u> for timber production (B+D)	1,174,566
F. Lands suitable for timber production (C-D)	141,626

¹⁶ The following Regional Dominance Types (CalVeg Forest Types) are recognized as capable of adequate restocking within 5 years: giant sequoia, Pacific Douglas-fir, Douglas-fir-ponderosa pine, eastside pine, Jeffrey pine, mixed conifer-giant sequoia, incense cedar, mixed conifer-fir, mixed conifer-pine, ponderosa pine, red fir, and white fir. In addition, Order 3 soil survey data was used to inform the likelihood of regeneration success.

Lands Suitable for Timber Production

The final step in determining lands suitable for timber production is to determine which of the lands that *may* be suitable for timber production, are suited for timber production, based on compatibility with desired conditions and objectives:

- Timber production is a desired primary or secondary use of the land
- Timber production is anticipated to continue after desired conditions have been achieved
- A flow of timber can be planned and scheduled on a reasonably predictable basis
- Regeneration of the stand is intended
- Timber production is compatible with the desired conditions or objectives for the land

The following land categories are not suitable and have objectives or desired conditions that are not compatible with timber production: areas recommended for wilderness designation, wild river segments of eligible wild and scenic rivers,¹⁷ riparian conservation areas, and California spotted owl protected activity centers. These categories of lands are subtracted from lands that may be suitable for timber production. It is important to note that these categories of lands may overlap, for example, part of a California spotted owl territory may also be within a riparian conservation area. In table 21, the total numbers of acres in each category are shown, but the total number of acres where objectives or desired conditions are not compatible with timber production accounts for overlap and shows the number of acres subtracted from timber suitability with no double-counting of acres that fall into more than one category.

The Sierra National Forest includes approximately 141,626 acres that are suitable for timber production (figure 24 and table 21). Suitability indicates that timber production may be the primary or secondary management objective. Project designs often incorporate actions to meet a variety of objectives, such as riparian area enhancement, habitat maintenance or development, and scenic stability and integrity. Timber harvest for the purposes of timber production must be consistent with all applicable plan components.

On lands not suitable for timber production, timber harvest may occur to protect multiple-use values other than timber production, such as for salvage, sanitation, public health or safety. Multiple-use values may also include various restoration activities intended to move lands toward desired conditions. For example, meadow restoration may require cutting encroaching trees, or trees might be thinned to reduce stand density or manage species composition to be within the natural range of variation. These trees may be made available for sale, but the intent is to maintain the meadow or restore stand structure and composition towards desired conditions based on the natural range of variation. Timber harvest for multiple-use purposes other than timber production must be consistent with all applicable plan components.

¹⁷ Area includes a corridor incorporating approximately 0.25 miles on either side of eligible Wild and Scenic Rivers.

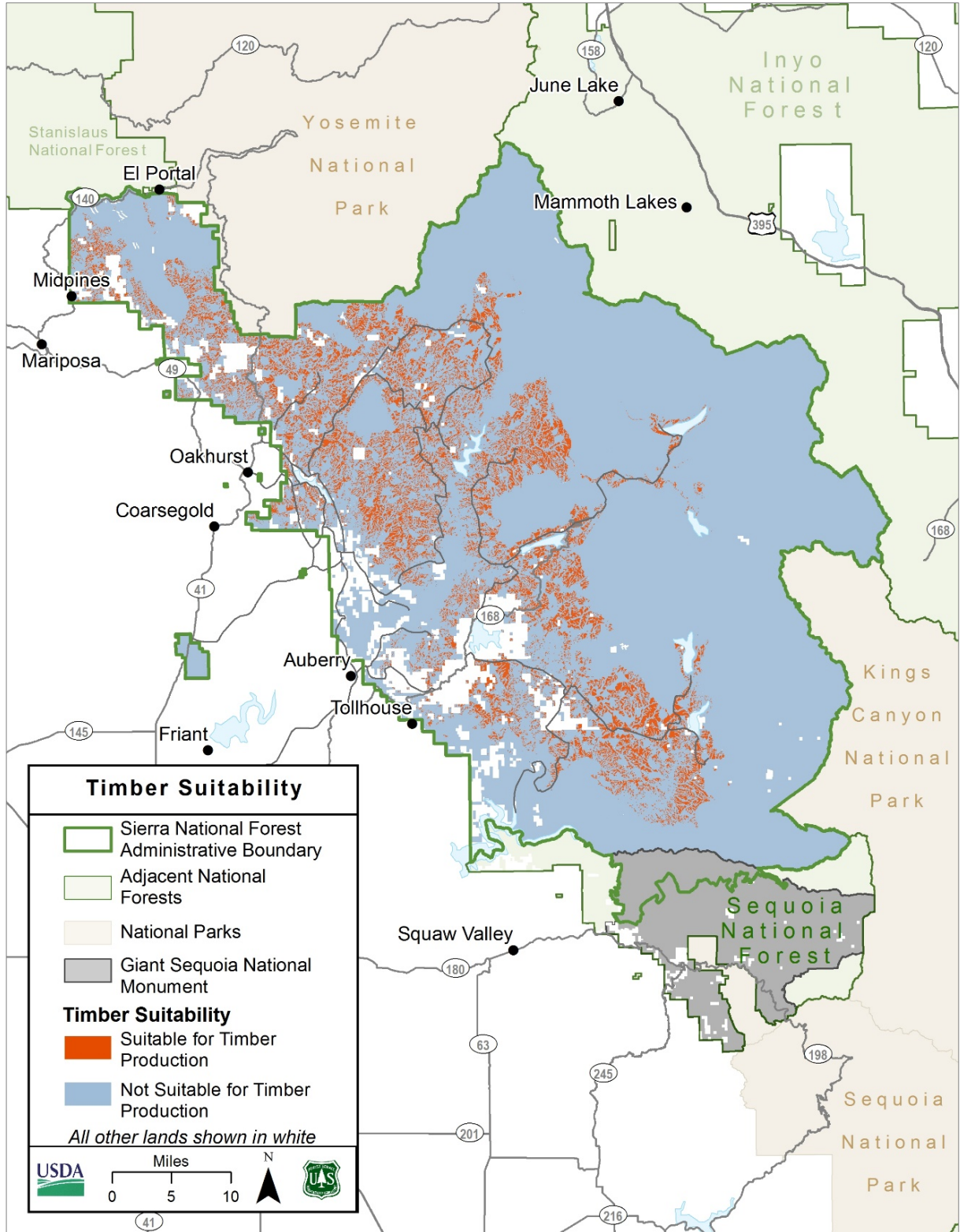


Figure 24. Timber suitability map of the Sierra National Forest

Planned Timber Sale Program

The planned timber sale program represents an estimation of treatment types planned to achieve the outcomes described by the plan's desired conditions and objectives, and consistent with other plan components during the plan period (by decade). The planned practices are based on the projected fiscal capability and organizational capacity of the planning unit, and are not a commitment to take an action or to develop a project-specific proposal for such action.

Sustained Yield Limit

The sustained yield limit is the amount of timber, meeting applicable utilization standards, "which can be removed from a national forest annually in perpetuity on a sustained yield basis."¹⁸ It is the volume that could be produced in perpetuity on lands that *may be suitable* for timber production. The calculation of the sustained yield limit is not limited by land management plan desired condition, other plan components, or the planning unit's fiscal capability and organizational capacity. The sustained yield limit for the lands that *may be suitable* for timber production is 487 million of cubic feet (MMCF) per decade.

Projected Wood Sale Quantity and Timber Sale Quantity

The estimated quantity of timber and all other wood products that is expected to be sold from the plan area for the plan period is called the projected wood sale quantity. The projected wood sale quantity consists of the projected timber sale quantity as well as other woody material such as fuelwood, firewood, or biomass that is also expected to be available for sale. The projected wood sale quantity includes volume from timber harvest for any purpose based on expected harvests that would be consistent with the plan components. The projected wood sale quantity is also based on the planning unit's fiscal capability and organizational capacity. Projected wood sale quantity is neither a target nor a limitation on harvest.

The projected timber sale quantity is the estimated quantity of timber meeting applicable utilization standards that is expected to be sold during the plan period. As a subset of the projected wood sale quantity, the projected timber sale quantity includes volume from timber harvest for any purpose from all lands in the plan area based on expected harvests that would be consistent with the plan components. The projected timber sale quantity is also based on the planning unit's fiscal capability and organizational capacity. Projected timber sale quantity is neither a target nor a limitation on harvest. Average volume outputs for the first and second decades for the Sierra National Forest planned timber sale program is displayed in table 22.

¹⁸ National Forest Management Act at section 11, 16 U.S.C. 1611; 36 CFR 219.11(d)(6)

Table 22. Average volume outputs for the 1st and 2nd decades for Sierra National Forest planned timber sale program.¹ The sustained yield limit for the lands that *may be* suitable for timber production is 487 MMCF² per decade.

Land suitability	Product Type	Product Subtype	1 st Decade MMCF	1 st Decade MMBF ³	2 nd Decade MMCF	2 nd Decade MMBF
Suitable ⁴	Timber Product ⁵	A1.Sawtimber	18-36	90-180	18-36	90-180
		A2.Other products	0-6	0-30	0-6	0-30
Not Suitable ⁶	Timber product	B1.Sawtimber	2-4	10-20	2-4	10-20
		B2.Other products	0	0	0	0
Both Suitable & Not Suitable	Timber Product Total	C. Projected Timber Sale Quantity (A1+A2+B1+B2)	20-46	100-230	20-40	100-230
Both Suitable & Not Suitable	Sawtimber Only	C1. Projected Sawtimber Sale Quantity (A1+B1)	20-40	100-200	20-40	100-200
Both Suitable & Not Suitable	Other Estimated Wood Products ⁷	D. Fuelwood	2-3	10-15	2-3	10-15
Both Suitable & Not Suitable	All	E. Projected Wood Sale Quantity (C+D)	22-49	110-245	22-49	110-245

1. NFMA limits the sale of timber to less the sustained yield limit for each decade of the plan (16 U.S.C. 1611). Providing estimates in the plan of the annual projected wood sale quantity and the annual projected timber sale quantity for the each of first two decades aligns with the NFMA decadal periods limiting the sale of timber, and provides estimates to cover a second decade if revision of the plan is delayed beyond the 15-year limit.

2. MMCF: Millions of cubic feet.

3. MMBF: Millions of board feet.

4. Lands suitable for timber production.

5. The timber product categories are for volumes other than for salvage or sanitation, that meet timber product utilization standards.

6. Lands not suitable for timber production.

7. Other estimated wood products include fuelwood, biomass and others that do not meet timber product utilization standards.

Vegetation Management Practices

Harvest of timber on National Forest System lands occurs for many different reasons, including ecological restoration, community protection in wildland-urban interfaces, habitat restoration, and protection of municipal water supplies. Timber harvest also contributes to economic sustainability through the production of timber, pulp for paper, specialty woods for furniture, and fuel as a renewable energy source. Timber harvest, whether for wood production, restoration, or other reasons, can support local businesses and employment.

Forest management on the Sierra National Forest consists of restoration and fuels reduction treatments designed to achieve desired conditions for each associated terrestrial vegetation type on suitable timber lands. The projected management approach uses an uneven-aged management system. Thinning would be used to increase individual tree vigor, increase horizontal heterogeneity, and reduce fuel hazards. Group selection would be used to regenerate suitable lands, increasing vertical and horizontal structure heterogeneity and moving species composition towards the natural range of variation. Table 23 displays estimates of acres of activity implemented by decade and vegetation management type for the Sierra National Forest. Other silvicultural practices may be used to achieve site-specific objectives such as those related to insect and pathogen concerns, meadow enhancement, or other objectives.

Table 23. Estimated vegetation management practices on the Sierra National Forest (acres implemented by decade)

Forestwide Vegetation Management Practice	1st Decade	2nd Decade
Thinning (Intermediate harvest)	20,000-40,000	20,000-40,000
Regeneration (Group Selection)	3,000-4,500	3,000-4,500
Precommercial Thinning	10,000-20,000	10,000-20,000

Even-aged management systems such as clearcuts or shelterwood cuts will not be used. These systems are not considered the best way to move towards desired conditions given current trends in southern Sierra conifer forests, including relative lack of large trees compared to natural range of variation, and continued loss of mature forest due to uncharacteristically severe fire and loss of large and old trees due to droughts and insect infestation interacting with overly dense stands. Therefore, this plan does not specify the maximum size of openings that would be created in even-aged regeneration harvests.

Forest management in wildfire protection zones and strategic ridge tops will be prioritized for treatment. Forest management on unsuitable lands is primarily responsive to safety concerns or disturbance agents such as wildfire, windthrow, insect and disease, or other restoration objectives. These include objectives such as moving species composition towards desired conditions, or reducing risk of loss of mature forest stands to insect infestations or uncharacteristic severe wildfire.

Silvicultural Treatments Used in Timber Management Prescriptions

While an uneven-aged management system will be the primary approach used to achieve desired conditions and restoration objectives, other silvicultural treatments may be used to better meet specific forest health and restoration objectives for long-term sustainability.

Reforestation

Reforestation is the act of renewing forest cover by establishing young trees. This is typically accomplished by planting nursery-grown seedlings, but establishment of seedlings from natural seeding of nearby sexually-mature trees may supplement areas planted with nursery-grown seedlings. In some cases, natural seedlings originating from nearby trees may be used to meet management objectives. In the case where desired tree species are capable of sprouting new trees from roots (such as oaks and aspen), prolific root sprouting can provide for effective reestablishment.

Site Preparation

Site preparation treatments are designed to enhance the success of regeneration efforts. A variety of methods may be used to reduce competing vegetation, planting obstacles and fuel levels. Ground-based equipment may be used to reduce tree and shrub levels, providing a more favorable environment for developing seedlings. Selective herbicides may be applied to suppress competing plants, reducing competition for soil moisture and sunlight. Fire may be used to reduce surface fuel or to consume woody material piled by machine or hand.

Seedling Establishment

As discussed under reforestation, new forests may be established by planting nursery-grown seedlings or by germinating seed from nearby mature trees. Seedlings are grown in tree nurseries, from selected seed sources, to meet the expected demands of the future growth environment. Selected species, numbers, and arrangements are designed to provide a variety of options for the future. Seedlings developing from seeding of nearby mature trees vary widely in number and arrangement and commonly establish, in pulses, over time.

In managed environments, planting selected species at designed numbers and arrangements provides advantages over the development of seedlings from nearby mature trees. Seedlings originating from seeding of nearby trees often provide numbers in excess of need and in undesirable arrangement. They may, however, provide for successful establishment of new forests in places regarded as difficult to plant, or where planted seedling mortality levels are unacceptably high. Regardless of origin, both sources benefit from actions taken to provide more favorable growth environments.

Seedling Stocking Criteria

The stocking criteria for lands suitable for timber production are indicated in table 24. They are designed to provide for the attainment of long-term desired conditions, and provide sufficient stocking to meet the potential forest product yields over time. The values apply after regeneration harvests, and after disturbances, like in areas affected by high-severity fire.

Table 24. Stocking criteria for suitable lands by forest type*

Forest Type	Region 5 Site Class	Trees per Acre Minimum
Ponderosa/Jeffrey Pine	0–3	200
Ponderosa/Jeffrey Pine	4–5	150
True Fir	All	300
Douglas-fir	All	225
Mixed Conifer	All	200

* Final density after stand establishment (within 5 years of harvest).

A certified silviculturist may write and implement a prescription that deviates from these stocking levels if site-specific conditions or objectives warrant doing so. On lands identified as suitable for timber production, successful restocking is expected to occur within 5 years of the final harvest.

Release

These treatments are designed to free young trees from undesirable competing vegetation. Treatments are aimed at increasing the availability of moisture, sunlight and nutrients to planted seedlings, thus increasing survival and favorable growth rates. Depending on conditions, release can be performed using hand tools, herbicides, or mechanical methods.

Precommercial Thinning

This treatment removes selected trees to reduce stocking and promote the growth and development of desirable trees. The removed trees are typically small and without sufficient value to cover the cost of the treatment.

Timber Harvest

The projected activities associated with scheduled forest management on suitable lands for timber production are geared toward uneven-aged management, a system using a planned sequence of treatments, designed to maintain and regenerate a stand with three or more age classes. The types of treatments used are primarily thinning and group selection.

- Thinning is commonly applied to decrease stand density and improve the health and growth rates of the remaining trees. It may also be designed to alter tree arrangement. Trees of merchantable size are selected for removal; trees of less than merchantable size are selected when the reduction of ladder fuels is an objective. The youngest age classes are typically excluded from thinning.
- Group selection is the most common method used to regenerate an age class. All, or most, of the trees are removed, followed by the establishment of seedlings. The size of the opening is variable, but is designed to provide sufficient site resources for favorable seedling establishment and growth. For example, establishment of shade-intolerant pine species typically requires larger openings than shade-tolerant true fir species. Unlike even-aged methods such as clearcutting, group selection openings are always smaller than an individual forest stand, and typically do not exceed three acres in size. Group selection harvests can be used to improve heterogeneity consistent with historic stand structures. Sierran mixed-conifer stands historically exhibited fine-scale heterogeneity with patch sizes commonly ranging between 0.05 and 0.75 acres whereas current stands are often relatively homogeneous over tens or hundreds of acres. Group selections may sometimes occur in larger patches up to 3 acres, depending on stand conditions, but will be designed to move towards the desired conditions of finer scale variability over time as stand development, natural disturbances, and intermediate treatments such as prescribed burning or thinning occur. Larger patch sizes than the natural range of variation may be necessary in some cases to ensure establishment of shade-intolerant species such as pines. The shift in species composition from pines to true shade-tolerant firs and cedars is also a significant departure from historic conditions and reestablishing appropriate species composition is also a necessary part of moving towards desired conditions over the long-term. Having appropriate species composition facilitates future modifications of stand structure towards desired conditions and also is important for long-term sustainability of Sierran mixed-conifer stands.

In addition to scheduled forest management, management may also occur in response to disturbance events (such as wildfire, windthrow, insects, parasites, or pathogen-related decline). Other harvest methods will likely apply to these specific conditions and project objectives. For example, after wildfire, and especially on suitable land, salvage harvests may be implemented to recover the economic value of dead and dying trees and to reduce the fuel environment. Other events, such as windthrow and insect- and pathogen-related infestations, may lead to salvage or sanitation harvests, to recover economic value and improve residual stand health.

Safety considerations, although not regarded as a component of a harvest system, will likely lead to the harvest of dead and dying trees, as well as living trees deemed a risk, that may fail along roads and other places where people or property are threatened. This action, commonly referred to as hazard tree removal, or tree risk reduction, may be used extensively along roads and trails within wildfire areas.

Appendix F: Aquatic and Riparian Conservation Strategy

Introduction

This appendix describes how the water, watersheds, aquatic species, and riparian plan components are integrated together into a strategy that retains, restores, and protects the processes that provide habitat for aquatic and riparian-dependent organisms, and produce and deliver high-quality waters for which the national forests were established. The aquatic and riparian strategy adopts an approach focused on maintaining and restoring ecological integrity and dynamic processes across broad landscapes.

This strategy updates direction for riparian and aquatic ecosystems originally provided by the Sierra Nevada Forest Plan Amendment (2004) with direction from the 2012 planning rule. The planning rule includes requirements for maintaining and restoring watersheds and the ecological integrity of aquatic ecosystems, water resources, and riparian areas in the plan area. The increased focus on watersheds and water resources in the 2012 planning rule reflects the Forest Service's commitment to the stewardship of water resources. The 2012 Planning Rule defines ecological integrity as "the quality or condition of an ecosystem when its dominant ecological characteristics (for example composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence." The strategy is also consistent with the goals of the National Fish and Aquatic Strategy (2017) that includes conservation of fish and aquatic resources and strengthening partnerships for stewardship of aquatic and riparian ecosystems and dependent species.

Plan Components

This plan includes components to maintain or restore water quality and the structure, function, composition, and connectivity of aquatic ecosystems in the plan area. Potential stressors, including climate change, and how these could affect ecosystem health and resilience were considered. Plan components include desired conditions, goals, objectives, standards and guidelines.

Plan components of the aquatic and riparian strategy are provided for the following topics:

1. **Watershed Conditions (Forestwide):** Plan components cover the broad area of soils and water throughout the Sierra National Forest at the watershed scale. Watersheds include riparian conservation areas and the riparian and aquatic environments contained within them, such as rivers, streams, meadows, springs, and seeps.
2. **Riparian Conservation Areas:** Lands along streams and unstable and potentially unstable areas where special standards and guidelines direct land use.
3. **Conservation Watersheds:** Conservation watersheds are a specific subset of watersheds selected by national forest managers to provide for continued high-quality water sources and the long-term persistence of at-risk species.
4. **Monitoring:** Monitoring forms the basis for continuous improvement of the forest plan and provides information for adaptive management with the plan area. Questions and indicators are identified for evaluating the effectiveness of plan components.

Watershed Conditions (Forestwide)

Plan components found in this section of the plan cover the broad area of soils and water throughout the Sierra National Forest at the watershed scale. Watersheds include riparian conservation areas and the riparian and aquatic environments contained within them, such as rivers, streams, meadows, springs, and seeps. Plan components specific to these areas are also found here.

Priority watersheds are where plan objectives for restoration are implemented to maintain or improve watershed condition. The Forest Service Watershed Condition Framework is used to identify priority watersheds for restoration. The Framework provides national direction to protect high value watersheds on the national forest and provide maximum flexibility to improve water quality, species habitat, and watershed condition. The Sierra National Forest currently has two priority watersheds within the plan area. The list of priority watersheds can be changed administratively without a forest plan amendment. Watershed Condition Framework priority watersheds are mapped online at the Forest Service Watershed Condition and Prioritization Interactive map (http://www.fs.fed.us/biology/watershed/condition_framework.html).

Priority watersheds differ from conservation watersheds in several ways:

- Conservation watersheds are large areas composed of multiple subwatersheds (HUC-12; see glossary). Priority watersheds are much smaller and are generally equivalent to HUC-12 watersheds in size and area.
- Conservation watersheds represent a long-term prioritization for maintenance and restoration of watersheds that remains in effect for the life of the plan. Priority watersheds are a short-term tactical approach to restoration of HUC-12 watersheds. Watershed restoration action plans for priority watersheds are developed and implemented over a 5- to 7-year period. New priority watersheds are identified following completion of restoration activities and the cycle repeats.
- The development of watershed restoration action plans is specific to priority watersheds only.

Riparian Conservation Areas

Riparian conservation area plan components apply to the entire riparian conservation area, as well as the specific riparian and aquatic environments contained within them, such as rivers, streams, meadows, springs, and seeps. Management activities in riparian conservation areas are designed to protect, restore, or enhance water quality and the ecological health and function of aquatic and riparian ecosystems and associated resources. Riparian areas and aquatic habitat standards were developed to protect hydrologic processes, water temperatures, flows, connectivity, aquatic species, shorelines, and occupied native cutthroat trout stream reaches.

Riparian conservation area widths are defined by type:

- perennial streams, 300 feet on each side of the stream, measured from the bank full edge of the stream;
- seasonally flowing streams (includes intermittent and ephemeral streams), 150 feet on each side of the stream, measured from the bank full edge of the stream;
- streams in inner gorges (defined by stream adjacent slopes greater than 70 percent gradient), top of inner gorge;

- special aquatic features (e.g., lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs) or perennial streams with riparian conditions extending more than 150 feet from edge of streambank, or seasonally flowing streams with riparian conditions extending more than 50 feet from edge of streambank, 300 feet from edge of feature or riparian vegetation, whichever width is greater; and
- other hydrological or topographic depressions without defined channels (for these, riparian conservation area widths and protection measures are determined through project level analysis).

Riparian conservation area widths may be adjusted at the project level if interdisciplinary analysis demonstrates a need for different widths to maintain or improve aquatic or riparian habitats. Any changes to the mapped and defined widths will require an interdisciplinary analysis to show how proposed changes are consistent with riparian conservation area management direction.

In most cases, riparian conservation areas contain equipment exclusion zones that have the same widths as the areas or are nested within them. Equipment exclusion zones vary by feature type and can be adjusted based on factors such as slope and soil stability. The equipment exclusion zone width is within 100 feet of perennial streams, meadows springs, and seeps; 75 feet for intermittent streams, and 25 feet for ephemeral streams that contain stream structure or riparian vegetation. Adjustments will be made only after consultation with one or more experts in soils, hydrology, fisheries, and aquatic ecology. Any project occurring within the exclusions zone will repair any damage, including stabilizing soils.

Riparian conservation areas are defined under the 2012 planning rule as lands of a specific character, not as management areas. Plan components apply to land of specific character (Forest Service Handbook 1909.12, section 22.2). Riparian areas are included as lands of a specific character because they are not tied to a specific management or geographic area, and are found across the entire national forest.

Conservation Watersheds

The importance of a landscape-scale approach to establish functioning aquatic and riparian ecosystems to protect at-risk species is widely accepted. Large-scale aquatic preserves allow for connectivity of habitat where appropriate, allow species to shift their distributions in response to climate change, and focus on maintaining high quality habitat.

Protecting headwaters has a profound influence on shaping downstream water quantity and water quality and species diversity. Conservation Watersheds support networks of properly functioning watersheds that support populations of fish, other aquatic and riparian-dependent organisms, and State-designated uses of water while enabling provision of multiple other goods and services such as outdoor recreation, timber, forage, and habitats for plants and wildlife.

Conservation watersheds were designed to complement priority watersheds identified through the agency's 2011 Watershed Condition Framework. By definition, priority watersheds under the Watershed Condition Framework are designated for 5 to 7 years. In contrast, conservation watersheds are intended to help protect and maintain the most intact aquatic systems as well as restore degraded watersheds of high importance for stewardship of fish, aquatic resources, and water quality over the long term. The Sierra National Forest is committed to working in cooperation with the State of California, other Federal agencies and in partnership with many other entities to accomplish maintenance and restoration of the Conservation Watersheds.

During selection of conservation watersheds, resource specialists considered maximizing resilience and connectivity of habitat where appropriate for at-risk species; selecting watersheds that were primarily in national forest ownership with high quality habitats for at-risk species; and at-risk species distributions. Local knowledge, stakeholder input, and scientific literature were also considered. Local knowledge was used to evaluate the most vulnerable at-risk aquatic species locations to be protected, maintained, or improved. The selection of conservation watersheds was based on the aforementioned factors and the additional criteria below:

- Highest priority areas to ensure species persistence, especially at-risk aquatic species
- Provision of high quality water for species and other beneficial uses (municipal watersheds) and protecting the best first
- In good condition: functioning or functioning-at-risk according to Watershed Condition Framework
- Anchored to areas (like wilderness or inventoried roadless areas) that augment resilience
- At spatial scales to facilitate networks of high-quality watersheds and connectivity among them to provide resilience in face of large-scale unplanned events, like fire or floods
- Relationship to priority watersheds

Conservation watersheds were selected where agreements on all criteria were met.

Monitoring Indicators

Monitoring forms the basis for continuous improvement of the forest plan and provides information for adaptive management within the plan area. Monitoring activities are focused on the following topics:

- The status of select watershed conditions.
- The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
- The status of focal species to assess the ecological conditions required under the Code of Federal Regulations, specifically 36 CFR 219.9.
- The status of a select set of ecological conditions required under 36 CFR 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation.
- Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
- The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)).

The questions associated with these indicators address watershed condition, water quality, ecological conditions of riparian ecosystems; aquatic (benthic) macroinvertebrate diversity, species composition; and related metrics; and stream temperature including changing patterns during the year. The indicators related to watershed health includes soil disturbance, fire regimes, and tree mortality.

Conservation Watershed Descriptions

The following section provides information on the Conservation Watersheds identified on the Sierra National Forest.

Kings River Conservation Watershed contains much of the upper Kings River watershed on the Sierra National Forest. Many of these subwatersheds have high overall biodiversity, moderate to high terrestrial diversity, and moderate aquatic biodiversity (<https://map.dfg.ca.gov/ace/>). Aquatic species at-risk contained within this conservation watershed include Lahontan cutthroat trout, mountain yellow-legged frogs, Kern Brook lamprey, and gregarious slender salamander.

San Joaquin Conservation Watershed contains much of the middle and upper San Joaquin River watershed area on the Sierra National Forest. Many of these sub-watersheds have high overall biodiversity, moderate to high terrestrial diversity, and moderate aquatic biodiversity (<https://map.dfg.ca.gov/ace/>). Aquatic species at-risk contained within this conservation watershed include Lahontan cutthroat trout.

Sustaining healthy watersheds and aquatic ecosystems that support an abundance and diversity of fish, other aquatic species, and their habitats is part of the Forest Service's mission. This strategy illustrates how the Sierra National Forest has committed to protecting, restoring, and enhancing watersheds and aquatic ecosystems upon which populations of fish and other aquatic species depend. This long term effort will enable the national forest staff to connect people to the outdoors through fishing, rafting, kayaking, and volunteer activities to clean the rivers. These types of activities bring economic, social, and cultural benefits to the underserved communities in the Central Valley, the southern Sierra foothills, and nearby Fresno.

Glossary

Adaptive capacity is the ability of ecosystems to respond, cope or adapt to disturbances and stressors, including environmental change, to maintain options for future generations.

Allotment management plan (AMP) is the plan that prescribes the livestock grazing practices necessary to meet specific resource objectives; specify the conditions within which the permittee(s) may adjust operations without prior approval of the authorized officer; and provide for monitoring to evaluate the effectiveness of management actions in achieving the specific resource objectives of the plan.

At-risk species are federally recognized threatened, endangered, proposed, and candidate species and species of conservation concern within the plan area.

Best management practices for water quality (BMPs) are methods, measures or practices selected by an agency to meet its nonpoint source control needs. Best management practices for water quality include but are not limited to structural and nonstructural controls and operation and maintenance procedures. Best management practices for water quality can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (36 CFR 219.19).

Biotic integrity refers to habitat that supports viable populations of native and desired nonnative plant, invertebrate, and vertebrate species. Species composition and structural diversity of plant and animal communities provide desired habitat conditions and ecological functions. New introductions of invasive species are prevented. Where invasive species are adversely affecting the viability of native species, the appropriate State and Federal wildlife agencies have reduced impacts to native populations. The distribution and health of biotic communities perpetuates functions and biological diversity.

Broader landscape is the plan area and the lands surrounding the plan area. The spatial scale of the broader landscape varies depending upon the social, economic, and ecological issues under consideration.

California spotted owl is a medium-sized brown owl with a mottled appearance: white spots on the head and breast, and a barred tail. California spotted owls are one of three subspecies of spotted owl. California spotted owls generally inhabit older forests that contain structural characteristics necessary for nesting, roosting, and foraging. Nests are typically found in areas of dense canopy cover, with a multi-layered canopy, old decadent trees, a high number of large trees, and coarse downed woody debris.

Activity center: spotted owl nest or roost.

Protected activity center: An area established around an occupied California spotted owl site to help ensure successful reproduction and species viability. A protected activity center is approximately 300 acres in size and includes the best owl nesting and roosting habitat. Management in protected activity centers is focused on reduction of surface and ladder fuels and includes retention of key habitat elements such as higher levels of canopy cover to provide the cool understory conditions owls need, and the down woody debris and forage (cover, fungi, seeds) needed by their prey. Management may involve

thinning and/or burning to reduce the risk of high-intensity wildfire, often with timing restrictions to prevent disturbance to owls during the breeding season.

Candidate species is a species under the purview of the U.S. Fish and Wildlife Service, for which the Fish and Wildlife Service possesses sufficient information on vulnerability and threats to support a proposal to list as endangered or threatened, but for which no proposed rule has yet been published by the Service. For species under the purview of the National Marine Fisheries Service, a candidate species is a species that is the subject of a petition to list as a threatened or endangered species and for which the Fisheries Service has determined that listing may be warranted, pursuant to section 4(b)(3)(A) of the Endangered Species Act (16 U.S.C. 1533(b)(3)(A)), or a species that is not the subject of a petition but for which the Fisheries Service has announced in the Federal Register the initiation of a status review.

Canopy closure is the percentage of the sky hemisphere obscured by vegetation when viewed from a single point.

Canopy cover is the percentage of forest floor covered by the vertical projection of the tree crowns.

Carbon carrying capacity is the amount of carbon that can be stored in a system as a function of prevailing climatic conditions and natural disturbance regimes, and a potential foundation for carbon management plans.¹⁹

Climate change adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli, or their effects, which moderates harm or exploits beneficial opportunities. This adaptation includes initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects: building resistance to climate-related stressors; increasing ecological resilience by minimizing the severity of climate change impacts, reducing the vulnerability, and increasing the adaptive capacity of ecosystem elements; and facilitating ecological transitions in response to changing environmental conditions.

Collaboration is a structured manner in which a collection of people with diverse interests share knowledge, ideas, and resources, while working together in an inclusive and cooperative manner toward a common purpose.

Community buffers are areas around communities that are adjacent to or surrounded by National Forest System lands that currently have high fire risk and where treatments on National Forest System lands are designed to reduce fire behavior and intensity. Human health and safety are the primary values at risk within these areas. Community buffers are within the community wildfire protection zone (see chapter 2).

Complex early seral habitat is a type of early successional forest habitat that contains structural, compositional, or functional elements of ecological complexity or integrity. These post-disturbance elements may include large snags, logs, and isolated live trees or tree clumps, as well as patches of young native shrubs, hardwoods, herbaceous plants or tree regeneration. Spatial

¹⁹ Hurteau, M.D. and M. L. Brooks. 2011. Short- and long-term effects of fire on carbon in U.S. dry temperate forest systems. *BioScience*, 61 (2):139-146.

heterogeneity in vegetation structure and diversity in vegetation composition during post-disturbance recovery is an important element of complexity in early seral forest habitat.

Connectivity is the ecological conditions that exist at several spatial and temporal scales to provide landscape linkages, including to permit the exchange of flow, sediments, and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long distance range shifts of species, such as in response to climate change.

Conservation is the protection, preservation, management or restoration of natural environments, ecological communities and species

Critical habitat for a threatened or endangered species is: (1) the specific areas within the geographical area occupied by the species, at the time it is listed and in accordance with the provisions of section 4 of the Endangered Species Act (16 U.S.C. 1533), on which are found those physical or biological features (a) essential to the conservation of the species, and (b) which may require special management considerations or protections; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act (16 U.S.C. 1533), upon a determination by the Secretary that such areas are essential for the conservation of the species, (16 U.S.C. 1532 section 3(5)(A)). Critical habitat is designated through rulemaking by the Secretary of the Interior or Commerce, Endangered Species Act (section 4 (a)(3) and (b)(2)).

Disturbance is any relatively discrete event in time that disrupts ecosystem, watershed, community, or species population structure and/or function, changing resources, substrate availability, or the physical environment.

Ecological conditions are the biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species, and the productive capacity of ecological systems. Ecological conditions include habitat and other influences on species and the environment. Examples of ecological conditions include the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses, and invasive species.

Ecological integrity is the quality or condition of an ecosystem when its dominant ecological characteristics (e.g., composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence.

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. Ecological restoration focuses on reestablishing the composition, structure, pattern and ecological processes necessary to facilitate terrestrial and aquatic ecosystem sustainability, resilience, and health under current and future condition.

Ecosystem is a spatially explicit, relatively homogeneous unit of the Earth that includes all interacting organisms and elements of the abiotic environment within its boundaries. An ecosystem is commonly described in terms of its: (1) composition or the biological elements within the different levels of biological organization, from genes and species to communities and ecosystems; (2) structure or the organization and physical arrangement of biological elements such as, snags and down woody debris, vertical and horizontal distribution of vegetation, stream habitat complexity, landscape pattern and connectivity; (3) function or the ecological processes

that sustain composition and structure, such as energy flow, nutrient cycling and retention, soil development and retention, predation and herbivory, and natural disturbances such as wind, fire and floods; and (4) connectivity.

Ecosystem services are benefits people obtain from ecosystems: (1) provisioning services, such as clean air and fresh water, energy, food, fuel, forage, wood products or fiber, and minerals; (2) regulating services, such as long-term storage of carbon; climate regulation; water filtration, purification, and storage; soil stabilization; flood and drought control; and disease regulation; (3) supporting services, such as pollination, seed dispersal, soil formation and nutrient cycling; and (4) cultural services, such as educational, aesthetic, spiritual, and cultural heritage values, recreational experiences, and tourism opportunities.

Endangered species are any species that the Secretary of the Interior or the Secretary of Commerce has determined is in danger of extinction throughout all or a significant portion of its range. Endangered species are listed in the Code of Federal Regulations at 50 CFR sections 17.11, 17.12, and 224.101.

Ephemeral stream is a stream that flows only in direct response to precipitation in the immediate locality (watershed or catchment basin), and whose channel is at all other times above the zone of saturation.

Even-aged stand refers to a stand of trees composed of a single age class.

Federally recognized Indian Tribe is an Indian Tribe or Alaska Native Corporation, band, nation, pueblo, village or community that the Secretary of the Interior acknowledges to exist as an Indian Tribe under the Federally Recognized Indian Tribe List Act of 1994 (25 U.S.C. 479a).

Final regeneration harvest is the final timber harvest in a sequence of harvests designed to regenerate a timber stand or release a regenerated stand. A final regeneration harvest could be a clearcut, removal cut of a shelterwood or seedtree system, or a selection cut.

Fine scale refers to areas less than 10 acres in size.

Fisher denning habitat is habitat used by females while raising young.

Fisher habitat core areas are large contiguous areas, greater than 15 square miles, of fisher habitat within which fishers can establish home ranges and comingle as a population. Fishers in the southern Sierra Nevada are distributed in a series of subpopulations separated by unsuitable habitat areas. Fisher habitat in the southern Sierra Nevada is segmented into a series of core habitat areas, which support these subpopulations, separated primarily by major river canyons, across which fishers may occasionally disperse via linkage areas (figure 10). The “core” habitat areas are contiguous polygons of modeled suitable fisher habitat large enough to support at least five adult females. There are seven fisher core areas, which are described in detail in the Southern Sierra Fisher Conservation Assessment²⁰ and the Southern Sierra Fisher Conservation Strategy.²¹ Cores 1 to 5 (1,621 square mile total area) are occupied currently by breeding fisher populations;

²⁰ Spencer, W.D., S.C. Sawyer, H.L. Romsos, W.J. Zielinski, R.A. Sweitzer, C.M. Thompson, K.L. Purcell, D.L. Clifford, L. Cline, H.D. Safford, S.A. Britting and J.M. Tucker. 2015. Southern Sierra Nevada fisher conservation assessment. Unpublished report produced by Conservation Biology Institute.

²¹ Spencer, W.D., S.C. Sawyer, H.L. Romsos, W.J. Zielinski, C.M. Thompson and S.A. Britting. 2016. Southern Sierra Nevada fisher conservation strategy. Unpublished report produced by Conservation Biology Institute.

Cores 6 and 7 (647 square mile total area) currently are not occupied by breeding fisher populations, although fishers are detected occasionally in core 6.

Fisher high value reproductive habitat includes California Wildlife Habitat Relationship (CWHR) size and density classes 4D, 5M, 5D, and 6 for the following habitat types: Douglas-fir, eastside pine, Jeffrey pine, lodgepole pine, montane hardwood-conifer, montane hardwood, montane riparian, ponderosa pine, red fir, subalpine conifer, Sierran mixed conifer, or white fir.

Fisher linkage area is a delineated polygon of habitats considered likely to facilitate dispersal between fisher habitat core areas, based on least-cost corridor models. Least-cost corridors are intended to represent the least risky areas for fishers to disperse between fisher habitat core areas, based on expert assumptions about fisher dispersal relative to vegetation, terrain and other factors.²¹

Fisher strategy area is a mapped area encompassing modeled fisher habitat core and linkage areas based on a grid of female breeding territory-sized (4 square miles) hexagonal cells. It represents the area used in the Southern Sierra Fisher Conservation Strategy²¹ to apply fisher conservation measures. The fisher strategy area consists of 1,012 hexagonal cells that include all areas considered likely to contribute substantially to sustaining the fisher population over the next 15 to 30 years.

Focal species refers to a small subset of species whose status permits inference to the integrity of the larger ecological system to which they belong, and provides meaningful information regarding the effectiveness of the forest plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the forest plan area. Focal species are commonly selected on the basis of their functional role in ecosystems.

Foreground refers to the scenery management system, detailed in Forest Service Handbook 701, with a distance zone consisting of a detailed landscape generally found from the observer to 0.5 mile away.

Forest land is land that is at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for nonforest uses. Land developed for nonforest use includes areas for agricultural crops, improved pasture, residential or administrative areas, roads of any width and adjoining road clearing, and powerline clearing of any width (36 CFR 219.19).

Forest recreation program niche is the specific recreation focus of a forest, incorporating public expectations with unique social and ecological features of the land. It is used to help focus to create the most public value with limited resources.

Fuelwood is wood used for conversion to some form of energy.

Functional hydrology refers to perennial and intermittent streams having the following characteristics: (1) stream energy during high flows is dissipated, reducing erosion and improving water quality; (2) streams filter sediment and capture bedload, aiding floodplain development; (3) meadow conditions enhance floodwater retention and ground water recharge; and (4) root masses stabilize stream banks against cutting action.

Functional restoration refers to restoration of abiotic and biotic processes in degraded ecosystems. Functional restoration focuses on the underlying processes that may be degraded, regardless of the structural condition of the ecosystem. Functionally restored ecosystem may have

a different structure and composition than the historical reference condition. As contrasted with ecological restoration that tends to seek historical reference condition, the functional restoration focuses on the dynamic processes that drive structural and compositional patterns. Functional restoration is the manipulation of interactions among process, structure and composition in a degraded ecosystem to improve its operations. Functional restoration aims to restore functions and improve structures with a long-term goal of restoring interactions between function and structure. It may be, however, that a functionally restored system will look quite different than the reference condition in terms of structure and composition and these disparities cannot be easily corrected because some threshold of degradation has been crossed or the environmental drivers, such as climate, that influenced structural and (especially) compositional development have changed.

Geographic area is a spatially contiguous land area identified within the planning area. A geographic area may overlap with a management area.

Great gray owl protected activity centers (PACs) are established and maintained to include the forested area and adjacent meadow around all known great gray owl nest stands. A protected activity center encompasses at least 50 acres of the highest quality nesting habitat (i.e., California wildlife habitat relationship type 6, 5D, and 5M) available in the forested area surrounding the nest. A protected activity center also includes the meadow or meadow complex that supports the prey base for nesting owls.

Greenline is a linear grouping of perennial plants at or near the stream channel.

Groundwater-dependent ecosystem refers to the community of plants, animals, and other organisms whose extent and life processes depend on groundwater. Examples include wetlands, groundwater-fed lakes and streams, cave and karst systems, aquifer systems, springs, and seeps.

Growing stock is all trees growing in a forest or in a specified part of it, usually commercial species, meeting specified standards of size, quality, and vigor, and generally expressed in terms of trees per acre, density, or volume.

Heritage Resources are an object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Heritage resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties. Heritage resources include the entire spectrum of resources for which the Forest Service is responsible, from artifacts to cultural landscapes without regard to eligibility for listing on the National Register of Historic Places. These resources represent past human activities or uses and, by their nature, are considered an irreplaceable and nonrenewable resource if not managed for preservation over the long term.

Hydrologic unit code (HUC) is a hierarchical system developed by the U.S. Geological Survey identifying all the drainage basins in the United States in a nested arrangement from largest (regions) to smallest (cataloging units). Hydrologic units are assigned a code, and the number of digits represent a region (2 digits), subregion (4 digits), basin (6 digits), subbasin (8 digits), watershed (10 digits) and subwatershed (12 digits).

Inherent capability of the plan area is the ecological capacity or ecological potential of an area characterized by the interrelationship of its physical elements, its climatic regime, and natural disturbances.

Integrated resource management refers to multiple-use management that recognizes the interdependence of ecological resources and is based on the need for integrated consideration of ecological, social, and economic factors.

Intermittent stream is a stream or reach of stream channel that flows in its natural condition only during certain times of the year, or in several years, and is characterized by interspersed, permanent surface water areas containing aquatic flora and fauna adapted to the relatively harsh environmental conditions found in these types of environments.

Invasive species are alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health; species that causes, or is likely to cause harm and that is exotic to the ecosystem it has infested. Invasive species infest both aquatic and terrestrial areas and can be identified within any of the following four taxonomic categories: plants, vertebrates, invertebrates, and pathogens.

Landscape refers to a defined area, irrespective of ownership or other artificial boundaries, such as a spatial mosaic of terrestrial and aquatic ecosystems, landforms, and plant communities, repeated in similar form throughout such a defined area.

Landscape-scale refers to areas that are greater than 10,000 acres in size.

Line officer is a Forest Service official who serves in a direct line of command from the Chief.

Maintain in reference to an ecological condition is to keep in existence or continuance of the desired ecological condition in terms of its desired composition, structure and processes. Depending upon the circumstance, ecological conditions may be maintained by active or passive management or both.

Management area is land area identified within the planning area that has the same set of applicable plan components. A management area does not have to be spatially contiguous.

Management intensities are the set and schedule of management practices typically used for certain forest or timber types to achieve desired conditions that may include timber production.

Management practices (vegetation management practices) are silvicultural practices such as reforestation, prescribed fire, thinning to reduce stand density, and other practices designed to facilitate growth and development of trees.

Management system is a timber management system including even-aged management and uneven-aged management.

Marten habitat core areas are large contiguous areas of marten habitat within which martens can establish home ranges and comeingle as a population.²²

Mean annual increment of growth is the total increment of increase of volume of a stand (standing crop plus thinning) up to a given age, divided by that age. The **culmination of mean annual increment of growth** is the age in the growth cycle of an even-aged stand at which the average annual rate of increase of volume is at a maximum. In land management plans, the mean

²² Spencer, W. and H. Rustigian-Romsos. 2012. Decision-Support Maps and Recommendations for Conserving Rare Carnivores in the Interior Mountains of California. Unpublished report produced by Conservation Biology Institute

annual increment of growth is expressed in cubic measure and is based on the expected growth of stands according to intensities and utilization guidelines in the plan (36 CFR 219.19).

Metamorphosis is the process the toads undergo to change between the larval forms to juvenile toads.

Mid-scale refers to areas that are hundreds to thousands of acres in size.

Mitigate is to avoid, minimize, rectify, reduce or compensate the adverse environmental impacts associated with an action.

Monitoring is a systematic process of collecting information to evaluate effects of actions or changes in conditions or relationships.

Multiple use is the management of all the various renewable surface resources of the National Forest System so that they are used in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output, consistent with the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. 528–531).

National Forest System includes lands and facilities administered by the Forest Service within the boundaries of national forests, national grasslands, and the national tallgrass prairie.

Native species is an organism that is, or was historically, present in a particular ecosystem as a result of natural migratory or evolutionary processes and not as a result of an accidental or deliberate introduction into that ecosystem. An organism's presence and evolution (adaptation) in an area are determined by climate, soil, biotic and abiotic factors.

Natural range of variation is the variation of ecological characteristics and processes over scales of time and space that are appropriate for a given management application. In contrast to the generality of historical ecology, the natural range of variation concept focuses on a distilled subset of past ecological knowledge developed for use by resource managers; it represents an explicit effort to incorporate a past perspective into management and conservation decisions. The pre-European influenced reference period considered should be sufficiently long, often several centuries, to include the full range of variation produced by dominant natural disturbance regimes such as fire and flooding, and should also include short-term variation and cycles in climate. The natural range of variation is a tool for assessing the ecological integrity and does not necessarily constitute a management target or desired condition. The natural range of variation can help identify key structural, functional, compositional, and connectivity characteristics, for which plan components may be important for either maintenance or restoration of such ecological conditions.

Nonforest land is land that does not meet the definition of forest land.

Patch refers to a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate. Patches have a definite shape and spatial configuration, and can be described compositionally by internal variables such as number of trees, number of tree species, age of trees, height of trees, or other similar measurements.

Perennial stream is a stream or reach of a channel that flows continuously, or nearly so, throughout the year and whose upper surface is generally lower than the top of the zone of saturation in areas adjacent to the stream.

Persistence is continued existence.

Plan components are the parts of a national forest land management plan that guide future project and activity decision-making. Specific plan components may apply to the entire plan area, to specific management areas or geographic areas, or to other areas as identified in the plan. Every plan must include the following plan components: desired conditions; objectives; standards; guidelines; suitability of lands. A plan may also include goals as an optional component.

Plan monitoring program is an essential part of the land management plan that based on plan components sets out the plan monitoring questions and associated indicators. The plan monitoring program informs management of resources on the plan area and enables the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed.

Productivity is the capacity of National Forest System lands and their ecological systems to provide the various renewable resources in certain amounts in perpetuity. For the purposes of land management planning, productivity is an ecological term, not an economic term (36 CFR part 219).

Project refers to an organized effort to achieve an outcome on National Forest System lands identified by location, tasks, outputs, effects, times and responsibilities for execution.

Proposed species is any species of fish, wildlife or plant that is proposed by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service in the Federal Register to be listed under section 4 of the Endangered Species Act.

Reasonable assurance is a judgment made by the responsible official based on best available scientific information and local professional experience; practices that are based on existing technology and knowledge are likely to deliver the intended results. Reasonable assurance applies to average and foreseeable conditions for the area and does not constitute a guarantee to achieve the intended results.

Recovery is a word used with respect to threatened or endangered species to denote the improvement in the status of a listed species to the point at which listing as federally endangered or threatened is no longer appropriate.

Recreation opportunity is an opportunity to participate in a specific recreation activity in a particular recreation setting and enjoy desired recreation experiences and other benefits that accrue. Recreation opportunities include primitive, nonmotorized, motorized, developed, and dispersed recreation on land, water and in the air.

Recreation setting is the social, managerial and physical attributes of a place that when combined, provide a distinct set of recreation opportunities. The Forest Service uses the recreation opportunity spectrum to define recreation settings and categorize them into six distinct classes: primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban.

Resilience is the ability of an ecosystem and its component parts to absorb, or recover from the effects of disturbance through preservation, restoration or improvement of its essential structures and functions, and redundancy of ecological patterns across the landscape.

Responsible official is the official with the authority and responsibility to oversee the planning process and to approve a plan, plan amendment, and plan revision (36 CFR 219.62).

Restocked is the condition of the growing space occupancy of trees that is to be achieved after a disturbance that substantially altered the previous stocking.

Riparian areas include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at variable widths.

Risk is a combination of the likelihood that a negative outcome will occur and the severity of the subsequent negative consequences.

Rotation is the number of years (including the regeneration period) required to establish and grow timber under an even-aged management system to a specified condition or maturity for regeneration harvest.

Satisfactory soils are soil conditions with favorable structure and infiltration characteristics to absorb and filter precipitation, and support adequate vegetative cover to minimize erosion and sustain desired habitat diversity.

Satisfactory condition for range vegetation is good to excellent vegetation condition or fair vegetation condition with an upward trend.

Scenic character is a combination of the physical, biological and cultural images that give an area its scenic identity and contributes to its sense of place. Scenic character provides a frame of reference from which to determine scenic attractiveness and to measure scenic integrity.

Scenic integrity objectives in the context of the forest plan are equivalent to goals or desired conditions. Scenic integrity describes the state of naturalness or a measure of the degree to which a landscape is visually perceived to be “complete.” The highest scenic integrity ratings are given to those landscapes that have little or no deviation from the landscape character valued by constituents for its aesthetic quality. Scenic integrity is the state of naturalness or, conversely, the state of disturbance created by human activities or alteration. Scenic integrity is measured in five levels:

Very high: landscapes where the valued landscape character “is” intact with only minute, if any deviations. The existing landscape character and sense of place is expressed at the highest possible level.

High: landscapes where the valued landscape character appears unaltered. Deviations may be present but must repeat the form, line, color, texture and pattern common to the landscape character so completely and at such scale that they are not evident.

Moderate: landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Low: landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape character being viewed but they

borrow valued attributes such as size, shape, edge effect, pattern of natural openings, vegetative type changes or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed, but compatible or complimentary to the character within.

Very Low: landscapes where the valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, pattern of natural openings, vegetative type changes or architectural styles within or outside the landscape being viewed. However, deviations must be shaped and blended with the natural terrain so that elements such as unnatural edges, roads, landings and structures do not dominate the composition.

Species of conservation concern are species, other than federally recognized threatened, endangered, proposed, or candidate species, that are known to occur in the plan area and for which the regional forester has determined that the best available scientific information currently indicates substantial concern about the species' capability to persist over the long-term in the plan area.

Stand is a contiguous group of trees sufficiently uniform in age class distribution, composition and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit, such as mixed, pure, even-aged and uneven-aged stands.

Stressors are factors that may directly or indirectly degrade or impair ecosystem composition, structure or ecological process in a manner that may impair its ecological integrity, such as invasive species, loss of connectivity, or the disruption of a natural disturbance regime.

Sustainability is the capability to meet the needs of the present generation without compromising the ability of future generations to meet their needs. For the purposes of the land management planning regulation at 36 CFR part 219, ecological sustainability refers to the capability of ecosystems to maintain ecological integrity; economic sustainability refers to the capability of society to produce and consume or otherwise benefit from goods and services, including contributions to jobs and market and nonmarket benefits; and social sustainability refers to the capability of society to support the network of relationships, traditions, culture and activities that connect people to the land and to one another, and support vibrant communities.

Sustainable recreation refers to the set of recreation settings and opportunities on the National Forest System that is ecologically, economically and socially sustainable for present and future generations.

Threatened species is any species that the Secretary of the Interior or the Secretary of Commerce has determined is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Threatened species are listed at 50 CFR sections 17.11, 17.12, and 223.102.

Timber harvest refers to the removal of trees for wood fiber use and other multiple-use purposes.

Timber production is the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts or other round sections for industrial or consumer use (36 CFR 219.19).

Trail corridor is an allocation established through the land use planning process, pursuant to section 7(a)(2) of the National Trails System Act (“rights-of-way”), for a public land area of sufficient width, within which to encompass national trail resources, qualities, values and associated settings, and the primary use or uses that are present or to be restored.

Uncharacteristic wildfire refers to wildfire that exceeds the natural range of variation in fire severity (such as high severity proportion, high severity patch size) and other fire effects indicators for a specific vegetation type.²³

Undesirable wildfire refers to wildfire that does not meet the desired conditions for a specific vegetation type.

Utilization standards are specifications for merchantable forest products offered in a timber sale.

Vegetation treatments include both mechanical treatments and prescribed burn treatments.

Viable population is a population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments (36 CFR 219.19).

Visible foreground is the area within the foreground distance zone (up to 0.5 mile) that is visible from a height of 5 feet on the trail, using terrain to define the boundaries.

Watershed is a region or land area drained by a single stream, river, or drainage network, a drainage basin.

Watershed condition is the state of a watershed based on physical and biogeochemical characteristics and processes.

Watershed condition framework is a national comprehensive and consistent approach for classifying watershed condition, proactively implementing integrated restoration in priority watersheds on national forests and grasslands, and tracking and monitoring outcome-based program accomplishments for performance accountability.²⁴

Wild and Scenic River is a river designated by Congress as part of the National Wild and Scenic Rivers System that was established in the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 (note), 1271–1287).

Wilderness is any area of land designated by Congress as part of the National Wilderness Preservation System that was established in the Wilderness Act of 1964 (16 U.S.C. 1131–1136).

Wildland fire refers to wildfire or prescribed fire.

Yosemite toad suitable breeding and rearing habitat includes wet portions of meadows, slow-moving streams, shallow ponds, spring systems, and lakes with shallow areas that are inundated at snowmelt and hold water for a minimum of 5 weeks in most years. Some sites containing suitable habitat may not retain water long enough for completion of metamorphosis in drought or below average precipitation years. Suitable habitat that is not used for breeding or development of

²³ Hardy, C. C. 2005. Wildland fire hazard and risk: Problems, definitions, and context. *Forest ecology and management*, 211(1), 73-82.

²⁴ USDA, Forest Service. 2011. Watershed Condition Framework; a framework for assessing and tracking changes to watershed condition. U.S. Department of Agriculture, Forest Service, Washington, Report FS-977

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early life history stages includes all portions of meadows or other occupied breeding habitats and surrounding areas up to a distance of 0.78 mile depending on surrounding landscapes and dispersal barriers. In some cases, additional areas may be important for dispersal.

Young of year are young metamorphed toads less than age 1 year.