



United States
Department of
Agriculture

Forest
Service

Southwestern
Region



Environmental Assessment for the Oak Creek Fuel Reduction Project

(Healthy Forest Restoration Act Project - HFRA)

Coconino National Forest

Red Rock Ranger District



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TTY).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TTY). USDA is an equal opportunity provider and employer.

Printed on recycled paper – September 2007

Content

Chapter 1 – Purpose and Need	1
Document Structure	1
Background.....	1
Purpose and Need for Action	3
Proposed Action	6
Decision Framework.....	7
Project Area.....	7
Relationship to Forest Plan	7
Public Involvement	9
Issues.....	10
Federal and State Permits, Licenses, and Certifications	11
Chapter 2 - Alternatives	13
Alternative Development Process.....	13
Items Common to All Alternatives	13
Alternatives Considered but Eliminated from Detailed Study.....	15
Alternatives Considered in Detail	16
Alternative 1 (No Action)	16
Alternative 2 (Proposed Action)	17
Comparison of Alternatives	22
Chapter 3 – Affected Environment and Environmental Consequences	24
Introduction.....	24
Environmental Effects of the Significant Issues	24
Chapter 4 - Consultation and Coordination	41
Appendix A	41
Mitigation Measures	41

List of Tables

Table 1-1. Timber Land Use Class within Management Area 14 and non-National Forest Acreages.....	9
Table 2-1. Vegetative Types and Treatments.....	18
Table 2-2. Comparison of Alternatives	22
Table 3-1. Special Status Species in Oak Creek Canyon WUI Analysis Area.....	22

List of Figures

Figure 1-1. Vicinity Map.....	After Page 7
Figure 2-1. Proposed Treatment Map North Section	After Page 17
Figure 2-2. Proposed Treatment Map South Section	After Page 17

Chapter 1 – Purpose and Need

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- **Introduction:** The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency’s proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- **Comparison of Alternatives, including the Proposed Action:** This section provides a more detailed description of the agency’s proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- **Environmental Consequences:** This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- **Agencies and Persons Consulted:** This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Red Rock Ranger District Office in Rimrock, Arizona.

Background

The 2000 fire season was undoubtedly one of the most challenging on record. As of early October, more than 6.8 million acres of public and private lands burned—more than twice the 10-year national average. The magnitude of these fires is the result of two primary factors: a severe drought, accompanied by a series of storms that produced thousands of lightning strikes followed by windy conditions. In addition, the long-term effect of almost a century of aggressively suppressing all wildfires has led to an unnatural buildup of brush and small trees in our forests and rangelands.

In 2000, in response to a request by President Clinton, the Secretaries of Agriculture and the Interior developed an interagency approach to respond to severe wildland fires, reduce their impacts on rural communities, and assure sufficient firefighting capacity in the future. This

report¹ outlined a strategy to reduce wildland fire threats and restore forest ecosystem health in the interior West. The strategy builds on the premise that within fire-adapted ecosystems, reducing fuel levels and using fire at appropriate intensities, frequencies, and time of year are key to: restoring healthy, resilient conditions; sustaining natural resources; and protecting people. On September 9, 2000, President Clinton accepted the recommendations contained in the Report and directed the two Secretaries to implement those actions. The National Fire Plan for the USDA Forest Service (NFP)² represents our response to the President's charge and subsequent funding requests to Congress.

The National Fire Plan addresses five key points: Firefighting; Rehabilitation and Restoration; Hazardous Fuel Reduction; Community Assistance; and, Accountability. The fuel management and reduction focus is critical to the Plan. It addresses overly dense forest vegetation that is the result of decades of fire exclusion from those lands. Fuel management activities will incorporate all types of treatments necessary to change stand condition classes (which reflect the level of damage that would result from a wildfire on those lands) from higher risk condition classes to lower risk condition classes, and to maintain those areas in which a desirable condition class has been established. In addition, activities will focus on Wildland-Urban Interface³ (WUI) areas to reduce risk to people and property. The Cohesive Strategy⁴ stated "the first priority for restoration will be the millions of acres already roaded and managed landscapes that are in close proximity to communities." The Cohesive Strategy went on to set four priorities: Wildland-urban interface, readily accessible municipal watersheds, threatened and endangered species habitat, and maintenance of existing low risk Condition Class 1 areas. The Oak Creek Fuel Reduction project is proposed in response to the fuels reduction element of the National Fire Plan and the Cohesive Strategy.

This fuels reduction project is intended to reduce the impacts and potential loss of property and life as a result of a large wildfire in Oak Creek Canyon. The proposed treatments are intended to keep a fire on the ground near private property and developed recreation sites in order to more effectively fight fires near structures and expand the time for evacuation in case of a large fire. It is also intended to: 1) reduce the number of small fires that become large, 2) improve capabilities for state and volunteer fire organizations, 3) reduce the threat to life and property from extreme fire behavior, 4) reduce ladder fuels in selected areas, 5) and reduce potential resource damage that could occur from extreme fire behavior.

¹ Managing the Impacts of Wildfires on Communities and the Environment: A Report to the President In Response to the Wildfires of 2000 (available on <http://www.na.fs.fed.us/nfp/overview/overview.htm>).

² see the National Fire Plan internet site for more information: <http://www.na.fs.fed.us/nfp/>

³ WUI includes those areas of resident human populations at imminent risk from wildfire, and human developments having special significance. These areas may include critical communications sites, municipal watersheds, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that if destroyed by fire would result in hardship to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

⁴ Protecting People and Sustaining Resources in Fire-Adapted Ecosystems: A Cohesive Strategy, October 2000 (Laverty et al., 2000) (available on <http://www.fireplan.gov/cohesive.cfm>)

However, due to the difficult, steep topography and closely interspersed locations of private property developments, fuels reduction activities in this project on federal lands will not be able to completely eliminate the potential for extreme fire behavior in Oak Creek Canyon.

The Coconino National Forest has been coordinating with the Sedona Fire District for many years collaborating on fuels management, fire suppression and prevention activities. Oak Creek Canyon is an area that both the fire district and the Forest Service have identified for fuels treatment both within the private property and on the National Forest. The Fire District has been sponsoring fuel reduction clean up activities for private land owners in the project area to facilitate fuel reduction on private property. The Fire District and Forest Service identified the Oak Creek Canyon area as one of the high priority areas within the Fire District for needing hazardous fuels reduction on both private and National Forest Service system lands. The Forest Service is working closely with the Sedona Fire District in encouraging hazardous fuel treatments on private lands. Treating fuels on private lands will enhance the efforts being proposed on federal lands. If private landowners participate in comparable fuel reduction activities adjacent to the National Forest, treatments on federal land will likely be more effective.

Lightning is the primary cause of wildfire ignitions in the canyon. These “natural” ignitions are generally in the higher elevations of the canyon or higher up on the canyon walls. Human caused ignitions are a very real threat as well. This type of ignition generally occurs in the canyon bottoms simply because that is where most people reside and travel. Due to the topography, prevailing winds and diurnal, or day to night, wind shifts, it is believed that a large wildfire would have a difficult time running the length of the canyon. This is not to say that this would be an impossible event, but it is less probable based on current experiences in the project area. A more probable scenario involves fires making uphill runs. From the point of ignition fires in the canyon tend to burn uphill rather than up canyon. Given the proper conditions, uphill and up canyon runs do occur, but the up canyon portion of this equation is usually limited in extent. With these thoughts in mind we believe the proposed action as explained in the following pages is an effective strategy to reduce the threat of large fires, improve the defensibility of property and ultimately, in a worst case scenario, buy the time needed to evacuate people from the canyon.

Although not a part of this proposed action, thought is being given to the less probable larger up canyon fire runs and initial planning and strategies. There are locations being identified in the canyon that could be used to redirect fire up and out of the canyon. These are primarily at places such as Casner, Munds, Sterling and Surveyor Canyons. Other areas are also being looked at for the ability to redirect a large fire out of the canyon. With appropriate vegetation removal and maintenance, these treated areas may provide the opportunity to help move fires out of the canyon. These actions would be considered in a separate analysis.

Purpose and Need for Action

The Oak Creek Fuel Reduction project is proposed at this time to respond to goals and objectives of the National Fire Plan and the Coconino National Forest Land and Resource Management Plan as amended (Forest Plan) (USDA Forest Service 1987). Comparison of the existing condition of the project area and the desired conditions from the Forest Plan indicates a need for:

- reduced forest fuel loading;
- reduced ladder fuels;

- reduced risk of uncharacteristically intense fire;
- reduced risk to life, property, and natural resources;
- increased safety to fire suppression crews and improved evacuation capabilities for state and volunteer fire organizations;
- development of sustainable forest conditions;
- restoration of natural ecological systems.

Implementation of this project in the Wildland Urban Interface (WUI) will allow for more effective management of wildland fire in areas adjacent to private property outside of the Wilderness, and reduce the risk to life and personal property in these areas by reducing the fuel loads, creating fuel breaks, and diversifying stand structure.

Existing Condition

The National Fire Plan and the Cohesive Strategy, developed after the severe wildfire season in 2000, provide direction to reduce fuel loadings in fire-prone forests to protect people and sustain resources. The wildland-urban interface (WUI), areas where flammable wildland fuels are near homes and communities, is one of the highest priorities for treatment. Studies conducted in early 2004 indicate that Oak Creek Canyon is generally considered to be in Fire Regime III where fire intervals are between 35 -100 years with a mix of fire severity. Additionally, this same area is considered to be in Condition Class 3 where the fire regime has been significantly altered from its historic interval range. This increases the risk of losing key ecosystem components due to dramatic changes in fire size, intensity, severity and landscape patterns. There will be some variation to these findings within the proposed treatment areas due to the significant vegetative and topographic diversity. These variations are displayed in the vegetation treatment table in Chapter 2, Table 2-1 that describes each proposed treatment area. Oak Creek Canyon is also identified in the Arizona Department of Forestry’s list of “Communities at Risk” of urban-interface communities that are at high-risk from wildfire in Arizona. This list is available in the Project Record.

Oak Creek Canyon is a narrow canyon of National Forest that contains developed recreation facilities and interspersed non-federal lands, mostly residential home sites and private businesses along Oak Creek, north of Sedona, Arizona. Oak Creek is a State-designated “unique water” that requires a higher degree of protection for water quality. State Route 89A, a state designated scenic highway, bisects the length of the project area. Steep topography, rock cliff faces, narrow side canyons, designated Wilderness areas and very limited road access make fighting fires in the project area very difficult. Fire suppression activities in the area are usually limited to hand crews, air support and structure protection/burnout operations. Areas adjacent to private property and developed recreation sites pose the higher risk related to fires starting and therefore are places that are considered critical to reduce fuel loads through thinning, mechanical treatment of brush, brush piling and broadcast burning to reduce the potential for fire spread and extend the time period for fire control and evacuation without loss of life, property, and major resource damage.

The potential for a wildfire start is high in the proposed treatment areas due to residential development, recreation use and lightning. Vegetative types, particularly the ponderosa pine/mixed conifer, were historically dependent on more frequent low intensity fires. These low

intensity fires have not occurred in recent history and therefore resulted in an unnatural buildup of dead materials has developed that could result in more intense and devastating effects from wildfires. Dense, closed canopies that include many smaller trees act as ladder fuels to larger over story trees. This results in wildfire easily traveling up to the crowns or tops of trees burning very intensely, instead of remaining on the ground and burning at a lower intensity.

The overall project area contains a mix of vegetation types, including 1) ponderosa pine/mixed conifer/oak woodland, 2) chaparral, 3) juniper woodlands and 4) riparian corridor. Each of these vegetation types has a different potential risk for large wildfires. In addition, the west side of the project area is a mix of sheer rock cliff faces with narrow stingers of chaparral and Ponderosa pine/mixed conifer canyons between.

Ponderosa pine/mixed conifer/oak woodland type: Preliminary analysis indicates that fuel loadings in the Oak Creek Canyon area are at a level that make wildland fire extremely difficult to control. Historical fire occurrence in the Ponderosa Pine type in the Southwestern United States averaged a fire every 3 to 10 years. In Oak Creek Canyon, these historical fires also tended to move into the mixed conifer and chaparral thereby reducing the hazardous “ladder” effect that these fuels can create if not checked by natural or mechanical means.

The Forest Service began aggressive suppression of wildland fires in the early 1900’s. This suppression strategy effectively halted the every 3 to 10 year-natural fire occurrences (fires not caused by man) in the ponderosa pine type and also the adjacent areas of mixed conifer and chaparral.

Chaparral: Chaparral in the Southwest typically burned on a 30-100 year interval prior to the early 1900’s, dependent upon elevation, aspect, soil conditions, and moisture, when not connected with ponderosa pine natural fires. The lack of natural fire or other mechanical treatments in chaparral since the early 1900’s has created an abundance of “fuel” (dead and down material, dead lower limbs and thick layers of non-decomposed organic material on the ground) causing fires to become harder to control and much more dangerous to the public and firefighters. In stand examinations in the project area, we have observed a very high percentage of dead aerial fuels in the chaparral indicating that it has not burned in many years. Fire history indicates a few small fires in the chaparral, but 90%+ of the chaparral in the canyon has not burned within the last 100 years.

Juniper Woodlands: Pinyon/juniper fuel types have a 100+ year fire cycle. Representative stands of these vegetation types do not show any fires of significant size in the past 50+ years.

Riparian: Riparian areas are more resistant to fires due to retention of moisture associated with Oak Creek. Temperatures are generally lowered adjacent to the creek and vegetation retains its moisture to a greater degree. Riparian areas are not as prone to wildfire and are typically not a fire hazard.

This excessive fuel loading, in addition to the topography, wind patterns, lack of access, and private property, all add to the potential for a devastating wildfire to occur within the project area in the above vegetation types. A reduction of fuel loading through the use of prescribed fire, and mechanical treatments such as thinning and brush removal will help to reduce this risk of intense fire and better protect private property and recreation sites.

Desired Condition

The desired conditions described for the Forest Plan management areas, in conjunction with the other Forest Plan direction, provide the parameters for identifying and defining project-specific desired conditions. The following desired conditions will help guide management of the project consistent with the Forest Plan, the significant issues (described below), and the ecological conditions of the project area.

Vegetation will be treated to reduce the risk of intense fire and better protect private property and recreation sites. Treatment areas with ponderosa pine fuels will have up to 90% of the “ladder” fuels removed, with a basal area of 60 square feet as the desired future condition in areas that are typically accessible, safe for workers and less than 40 percent slopes. Spacing between the trees will be irregular. Mixed conifer stands will be healthy with minimal areas of bug kill or blow down. Horizontal fuel continuity will be broken up in the chaparral fuels, to reduce the probability of intense fire behavior adjacent to private property, developed recreation facilities and State Route 89A. These breaks in the fuels will be large enough to be an effective tactical tool for firefighters, but will not be so large as to create watershed and/or long-term visual concerns. Pinyon juniper stands will be open with a good grass component in the understory. Treatments will minimize impacts to Mexican Spotted Owl PACS, riparian habitat and riparian obligate plants and animals. Scenic quality values will be protected for treatment actions will have short-term impacts and irregular appearance.

Proposed Action

The Coconino National Forest is proposing vegetative treatments on approximately 653 acres of National Forest System Land in response the purpose and need for action. Actions included in this proposal are:

- Approximately 250 acres of thinning ponderosa pine to 60 square foot basal area density or crown spacing (subject to 9-inch diameter or smaller)
- 400 acres of tree and vegetation removal as follows:
 - Juniper and pinyon will be removed to 40 square foot basal area,.
 - Oak 12-inches or greater diameter will be retained,
 - Limited removal of dead and down material in riparian areas and.
 - Removal of brush species.
- Broadcast prescribed burning over much of the 653 acres for maintenance after initial treatments (subject to mitigation measures, weather, containment lines and other safety considerations).
- Up to 653 acres of pile burning (subject to mitigation measures) or chipping and removal of slash if economical.

Chapter 2 has a complete description of the Proposed Action, specific mitigation measures, monitoring requirements, etc.

A "proposed action" results from a thorough analysis of the desired and existing conditions of an area before the NEPA process begins. Many possible actions may result from this analysis, however, only one or more are chosen to be brought forward in a site-specific NEPA document such as this EA. The proposed action finally presented to the public should be well defined. This gives the public and other agencies specific information on which to focus comments. Using these comments (see discussion of Significant Issues later in this chapter), and information from preliminary analysis, the interdisciplinary team then develops alternatives to the proposed action. These are discussed in detail in Chapter 2.

Decision Framework

Based on the environmental analysis in this EA, the Red Rock District Ranger will decide whether and how to reduce fuel loading and thus risk of catastrophic fire in the Oak Creek Fuel Reduction project area in accordance with Forest Plan goals, objectives and desired future conditions. The responsible official will decide whether to implement an action alternative, a modified action alternative, or the no action alternative. If an action alternative is selected, it will include:

- The location, design, and scheduling of the proposed thinning, burning, other activities or connected actions;
- Access management measures and;
- Mitigation measures and monitoring requirements.

Project Area

The project area is located on the Red Rock Ranger District of the Coconino National Forest, Coconino County, Arizona. It encompasses the Oak Creek Canyon area from private property near Casner Canyon north to the bottom of the switchbacks on Highway 89A (Sterling Canyon). The east and west boundaries are along the rim of Oak Creek Canyon. The area involved is approximately 8,500 acres in size, with just over 8,000 of these acres being Forest Service lands, with only approximately 653 acres proposed for treatment. There are also approximately 422 acres of private land within this area, and 54 acres of Arizona State Park lands. (See Figure 1-1, Vicinity Map).

Relationship to Forest Plan

The Forest Service has two types of decisions: programmatic (e.g., the Forest Plan) and project level which implements the Forest Plan. The Oak Creek Fuel Reduction EA is a project-level analysis; its scope is confined to addressing the significant issues and possible environmental consequences of the project. It does not attempt to address decisions made at a programmatic level.

The Forest Plan embodies the provisions of the National Forest Management Act of 1976, its implementing regulations, and other guiding documents. The Forest Plan sets forth in detail the direction for managing the land and resources of the Coconino National Forest. Where

appropriate, the Oak Creek Fuel Reduction EA also tiers to the Forest Plan Final Environmental Impact Statement (USDA Forest Service 1987, as amended), as encouraged by 40 CFR 1502.20.

Forest Plan Management Areas

The Forest Plan uses management areas to guide management of the national forest lands within the Coconino National Forest. Each management area provides for a unique combination of activities, practices and uses. The Oak Creek Fuel Reduction project area is located in one management area, Oak Creek Canyon MA#14. Goals, objectives and desired conditions are summarized below. The Forest Plan (pages 184 through 187-3) contains a detailed description of this management area and its goals, objectives, standards and guidelines. Sedona area-wide objectives are also described in Forest Plan pages 206-9 through 206-30 and indicate the goals to allow fire to play a natural ecological role within the constraints of human health and safety and to reduce the occurrence of catastrophic fires.

Oak Creek Canyon MA#14 includes the area just north of Sedona and rises to Oak Creek Vista adjacent to Oak Creek itself and State Route 89A. Management emphasis includes day-use activities that are pedestrian-oriented with access to Oak Creek and scenery. In addition, management emphasizes scenic driving, high quality recreation and cultural history interpretation, wildlife habitat, healthy stream condition and clean air and water. The other emphasis is “Fire hazards and risk are carefully managed within this streamside corridor.” The Wildland Urban Interface area (approximately 8000 acres) included areas within the MA#1, Wilderness but treatments are not proposed within MA#1.

Community objectives within this management area include using fire management activities for protection of life and property. Wildlife, plants, soil, air and water objectives include use of prescribed fire and mechanical methods to achieve fire management goals.

The Forest Plan was also amended to address Old Growth standards and guidelines in 1996.

Table 1-1 Describes the acreages of Timber Land Use Classes Within Management Area #14 including lands in state or private ownership.

Table 1-1 Timber Land Use Class within Management Area 14 and non-National Forest Acreages					
Unsuitable (Pinyon-Juniper)	Unsuitable (physically unsuited or not capable)	Forested lands not appropriate for timber harvest	Suitable timber lands	Other Ownership	Total Acres
3,709	1,477	414	000	646	6,246

Public Involvement

Scoping

The Council on Environmental Quality (CEQ) defines scoping as "...an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 CFR 1501.7). Among other things, the scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the environmental analysis process. Although scoping is to begin early, it is really an iterative process that continues until a decision is made. In addition to the following specific activities, the Oak Creek Fuel Reduction project has been listed on the Coconino National Forest Schedule of Proposed Actions since March 2001. To date, the public has been invited to participate in the project in the following ways.

Public Mailing

In March 2001, a letter providing information and seeking public comment was mailed to 461 individuals and groups. This included federal and state agencies, municipal offices, businesses, interest groups, and individuals. A total of 37 responses to this initial mailing were received. Letters expressed support for fuel reduction efforts in the project area. Some letters only expressed interest in being kept informed on the project planning and involved in the specific implementation planning. The ID Team reviewed the comments and responded in their specialist reports accordingly.

Additional scoping was conducted in August of 2005 with over 400 letters sent to landowners in Oak Creek Canyon. This letter and responses are in the Project Record. Again, responses supported fuels reduction in the project area.

Local News Media

A news release dated August 31, 2005 announced the public meeting on the project. Announcements about the project and meeting were printed in the local newspaper.

Public Meetings

A public meeting to discuss the Oak Creek Fuel Reduction proposal was held on September 10, 2005. Eleven members of the public attended this informational meeting and comments received were very supportive of the proposal. Comments from this meeting are in the Project Record.

Meetings with Agencies, Communities, Native Groups and Others

Red Rock District fire personnel met individually with local subdivisions several times (Pine Flat, Mission Rancho and Indian Gardens), and at those meetings explained the project and fuel concerns for the project area.

The following Native American Indian groups were notified of the project in the Coconino National Forest Annual Consultation letter dated February 19, 2002, as well as the Forest's Schedule of Proposed Actions and quarterly updates: Dine' Medicine Man's Association, Fort McDowell Yavapai Nation, Hopi Tribe, Hualapai Tribe, Havasupai Tribe, Navajo Nation, Pueblo of Zuni, San Carlos Apache Tribe, San Juan Southern Paiute Tribe, Tonto Apache Tribe, Yavapai-Apache Nation, Yavapai-Prescott Tribe, and White Mountain Apache Tribe. No replies about tribal concerns for this project were received. Additional meetings with the Hopi and Yavapai-Prescott Tribes on April 4 and April 25, (respectively), and a follow-up E-mail reply from the Yavapai-Apache Nation on June 11, 2002 also resulted in no concerns expressed for this project. No areas of traditional cultural importance or areas of specific tribal concern are known for this part of the Forest, based on previous consultations and Forest research into tribal uses of the Forest.

The Yavapai-Apache Nation, the Hopi Tribe, and the Yavapai Prescott Tribe concur with the recommendations of eligibility as per agreements of January 24, January 30, and February 4, 2002, respectively.

This project has been listed in annual consultation letters to these groups for the last several years.

Issues

Significant Issues

Scoping and public involvement activities are used to identify unresolved issues about the effects of the proposed action. The following issues were determined to be significant and within the scope of the project decision as prescribed in 40 CFR 1502.2. Issues are addressed through the proposed action, alternatives to the proposed action, mitigation measures, and design criteria. Additional issues considered but determined outside the scope of this project, are discussed separately below.

Issue 1: Air Quality and Smoke Management. Burning will create smoke in the Canyon, and nearby areas in the Verde Valley. No burning will be accomplished without the proper approval

from the Arizona State Department of Environmental Quality. Burning methods that are designed to reduce smoke impacts will be utilized at all times as long as public and firefighter safety are not compromised.

Issue 2: Visual and Recreational Quality. Visual quality and recreation experience will be reduced by treatment activities in the scenic corridor and near recreation facilities. Treatment methods will be coordinated with cooperating agencies and other District disciplines to insure that any impacts to Visual and Recreational quality are kept to a minimum, and are short term in duration.

Issue 3: Water Quality and Soil Stabilization. Water quality could be degraded as a result of treatments near unique water of Oak Creek. Treatments on steep slopes could result in unstable slopes or material. Treatments using understory burning prescribed fire will not occur within 150 feet from the riparian corridor of Oak Creek, or within 50 feet of any secondary drainages. Treatments on slopes greater than 40% will be limited in all vegetative types, less in chaparral, in order to eliminate adverse effect on soils and hydrology. Treated areas will be monitored by Staff specialists on the Forest to insure protection of water quality and soil resources during prescribed treatments.

Federal and State Permits, Licenses, and Certifications

To proceed with the proposed project as addressed in this EA, various permits must be obtained from federal and state agencies. The following permits will be obtained.

State of Arizona Department of Environmental Quality

Air quality attainment certification (per the Clean Air Act)

Applicable Laws and Executive Orders

Shown below is a partial list of federal laws and executive orders pertaining to project-specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Arizona. Disclosures and findings required by these laws and orders are contained in Chapter 3 or the Decision Notice for this EA.

Multiple-Use Sustained-Yield Act of 1960

National Historic Preservation Act of 1966 (as amended)

Wild and Scenic Rivers Act of 1968, amended 1986

National Environmental Policy Act (NEPA) of 1969 (as amended)

Clean Air Act of 1970 (as amended)

Endangered Species Act (ESA) of 1973 (as amended)

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)

National Forest Management Act (NFMA) of 1976 (as amended)

Clean Water Act of 1977 (as amended)

American Indian Religious Freedom Act of 1978

Archeological Resource Protection Act of 1980

Cave Resource Protection Act of 1988

Executive Order 11593 (cultural resources)

Executive Order 11988 (floodplains)

Executive Order 11990 (wetlands)

Executive Order 12898 (environmental justice)

Executive Order 12962 (aquatic systems and recreational fisheries)

Executive Order 13186 (Migratory Bird Treaty Act)

Project Record Availability

Additional documentation, including more detailed analyses of project-area resources, may be found in the project record located at the Red Rock Ranger District in Rim Rock, Arizona. Certain of these documents are referenced throughout the EA by author or record number in brackets. These records are available for public review pursuant to the Freedom of Information Act (5 U.S.C 552).

Chapter 2 - Alternatives

This chapter describes and compares the alternatives considered by the Forest Service for the Oak Creek Fuel Reduction project. It includes a discussion of how alternatives were developed, an overview of mitigation measures, monitoring and other features common to all alternatives, a description and map including specific mitigation measures of each alternative considered in detail, and a comparison of these alternatives focusing on the significant issues. Chapter 2 is intended to present the alternatives in comparative form, sharply defining the issues and providing a clear basis for choice among options by the responsible official and the public (40 CFR 1502.14).

Some of the information used to compare alternatives at the end of Chapter 2 is summarized from Chapter 3, “Environmental Consequences.” Chapter 3 contains the detailed scientific basis for establishing baselines and measuring the potential environmental consequences of each of the alternatives. For a full understanding of the effects of the alternatives, readers will need to consult Chapter 3.

Alternative Development Process

The Forest Service interdisciplinary team (IDT) used information from scoping, including the significant issues identified for the project (see Chapter 1), in conjunction with the field-related resource information, to formulate alternatives to the proposed action. The proposed action and each action alternative presented in this EA provide a different response to the significant issues; one alternative may respond to more than one issue. Each action alternative is also designed to meet the stated purpose and need for the Oak Creek Fuel Reduction project, and the project-specific desired conditions.

Each action alternative represents a site-specific proposal developed through intensive interdisciplinary evaluation of current and desired conditions, based on field verification. Project area identification and design also made use of high resolution topographic maps and a large quantity of resource data available in geographic information system (GIS) format.

Items Common to All Alternatives

Forest Plan Consistency

The proposed action is consistent with the Coconino Forest Plan. All applicable forest-wide and management area standards and guidelines have been incorporated into alternative design. The Forest Service uses many mitigation and preventive measures in the planning and implementation of land management activities. The application of these measures begins during the planning and design phases of a project. Additional direction comes from the Regional Guide, and applicable Forest Service manuals and handbooks.

Project-Specific Mitigation

The analysis documented in this EA discloses the possible adverse and beneficial impacts that may occur from implementing the actions proposed under each alternative. Measures have been

formulated to mitigate or reduce adverse impacts. These measures were guided by the direction from the Coconino Forest Plan previously described (in this chapter and in Chapter 1).

IDT specialists use on-the-ground inventories, computer (GIS) data, and various studies to prepare their reports. Resource reports show the cause and effect relationships between the alternatives and their specific effects, and indicate mitigations to reduce or eliminate those adverse effects in the design of the alternatives. These reports are summarized and referenced in this EA and may be found in the project record. Resource concerns and mitigation measures may be refined further during final design work, when specialists have one more opportunity to revise their recommendations.

Applicable Forest Plan standards and guidelines, the "Best Management Practices" (BMP's) used to meet the requirements of the Clean Water Act, and project-specific mitigation measures are identified in these reports.

Mitigation measures prescribed in the individual specialist reports (located in the project file) that will be followed during implementation of this project include:

- Soil/Water: No burning will occur within 150 feet of Oak Creek, or any of its main tributaries. No burning within 50 feet of secondary drainages.
- Riparian Areas: Only limited treatment in riparian areas such as removal of dead and downed material and some light thinning would occur. Prescribed burning will not occur within 150 feet of the riparian corridors including those of Oak Creek and Pumphouse Wash (see above mitigation measure).
- Wildlife: Appropriate mitigation measures are mandatory as per the April 2001 Regional Batched-Programmatic Wildland Urban Interface Biological Assessment and Opinion.
- Heritage Resources: Suspend work if a heritage site is discovered during project implementation. Authorize resumption of work only after consultation with the State Historic Preservation Office (SHPO) is complete. Any area with soil disturbing mechanical work will be surveyed and clearance obtained before a project begins. Known sites that could be impacted by project activities would be identified and appropriately protected prior to treatments.
- Visual Impacts: Efforts will be made when planning and implementing treatment blocks to minimize adverse effects to the unique visual qualities of the Canyon. Examples of mitigation include: edges of burns and mechanical treatments will be "feathered" and not designed in a straight line to minimize visual impacts to Forest and highway users.
- Oak trees 12-inches or greater in diameter at breast height will be retained, however they may be pruned to reduce ladder fuels.

See Appendix A for additional mitigation measures for this project.

Monitoring

Monitoring activities can be divided into Forest Plan monitoring and project-specific monitoring. The National Forest Management Act requires that National Forests monitor and evaluate their

forest plans (36 CFR 219.11). Chapter 5 of the Forest Plan includes the monitoring and evaluation activities to be conducted as part of Forest Plan implementation. There are three categories of Forest Plan monitoring: Implementation monitoring, effectiveness monitoring, and validation monitoring.

Effectiveness and validation monitoring are not typically done as part of project implementation. Implementation monitoring, and any additional project-specific monitoring, are however important aspects of the project.

Findings and Disclosures

Several of the laws and executive orders listed in Chapter 1 require project-specific findings or other disclosures. These findings and disclosures will be in the Decision Notice which will record the decision and rationale for decision by the Red Rock District Ranger.

Alternatives Considered but Eliminated from Detailed Study

Several alternatives were considered during the planning process, but have not been included in the EA for detailed study. These are described briefly below, along with the reasons for not considering them further.

Alternative A

Initially the Red Rock Ranger District proposed fuel reduction treatments throughout the entire area of Oak Creek Canyon WUI project area. Treatment in designated Wilderness was not included due to steep slopes and cliff rock faces between. Treatment in these areas would not conform to Wilderness values and would not result in benefits to fire suppression activities. Treatment in all areas of ponderosa pine, mixed conifer and oak woodlands was considered. It was determined that treatments of this vegetation type on slopes greater than 40 percent could result in unstable slopes and potential degradation of water quality in Oak Creek, a State designated unique water. In addition, this vegetation type in areas of more than 40 percent slopes is a mix of rock escarpments and narrow timbered canyons on the west side of Oak Creek Canyon. Treatments within these narrow side canyons are dangerous due to limited access and would not contribute to a reduction in fire risk. Rock faces and cliffs provide natural barriers to the spread of fire between adjacent narrow canyons.

Alternative B

Aerial ignition of chaparral slopes was considered as a possible alternative. On the east side of the canyon, slopes greater than 40 percent are prevalent and treatment on those slopes would have been limited in size each year with a buffer between strips to protect water quality. However, in reviewing implementation of this method, it was determined that rocks would likely be dislodged during this activity and after activities during weather events and could pose a threat to property and life below burned areas. Due to the proximity of private property and Highway 89A throughout the canyon below these chaparral slopes, it was determined this treatment would not be initiated.

Alternative C

Treatment in juniper woodlands was considered throughout this vegetation type. This vegetation

type has a lower fire hazard due to lower needle cast and greater natural spacing between trees. Juniper woodlands grow on lower quality sites not able to sustain other vegetation. Undergrowth is limited in these vegetation sites due to shallow, rocky soils and therefore fires do not spread easily. In addition, this vegetation type is located on more sensitive soils, subject to erosion. Treatments over the entire vegetation type in the canyon would destabilize soils and not result in a reduction of large scale fires. Therefore proposed treatments are limited to areas near private property and developed recreation facilities.

Alternative D

Treatments within most of the riparian areas and all of the Research Natural Areas were considered, but it was determined that treatments in these areas would result in unacceptable impacts to these resources.

Alternatives Considered in Detail

The proposed action and one alternative are considered in detail. Alternative 1 is the no-action alternative, under which the project area would receive no fuels reduction treatments at this time, and would remain subject to natural or ongoing changes only. The Proposed Action, Alternative 2 addresses the purpose and need as well as being consistent with the Greater Flagstaff Area Community Wildland Fire Plan (CWPP), which calls for low to intermediate thinning and burning in this area (subject to site specific analysis and refinement). In addition, the CWPP identifies the Oak Creek Canyon area as an area of high threat level. Additional alternatives are not necessary when issues are addressed by mitigation measures and when the project area is within a Wildland Urban interface area and within 1-1/2 miles of a community at risk. The Oak Creek Canyon project area meets these definitions as stated in the CWPP. The map for Alternative 1, the no-action alternative, represents the current condition of the project area. Treatments area maps reflect the Alternative 2, the Proposed Action. Larger-scale maps of the alternatives are contained in the project planning record.

Alternative 1 (No Action)

The emphasis of this alternative is to propose no fuels reduction treatments in the Oak Creek Fuel Reduction project area at this time. It does not preclude activities in other areas at this time or from the Oak Creek Fuel Reduction project area at some time in the future. The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14d) requires that a "no action" alternative be analyzed. This alternative represents the existing and projected future condition against which the other alternatives are compared.

The project area would remain as described in the Existing Condition section, and current trends would continue. Vegetation would continue to grow more densely, accumulating more dead and live fuels. The potential for uncharacteristically intense and severe wildfires would not be abated. Resistance to fire control would increase, while the ability to provide for public and firefighter safety and structure protection would continue to decrease.

Current management practices, including fire prevention in developed areas, fuel reduction on private property, removal of dead and dying trees along the power lines, noxious weed treatments, recreation use and maintenance, existing fire suppression actions and minor burning

activities will continue in the project area.

The No Action alternative would have no outputs, provide no opportunities for employment, and does not meet the purpose and need for the proposed action. The No Action does not move the project area towards the desired condition. It does, however, respond to the issue of smoke from prescribed burning by not proposing any burning in the area at this time.

Alternative 2 (Proposed Action)

The proposed action was designed to respond to the purpose and need described in Chapter 1, the National Fire Plan, and the regional priority of treating the Wildland Urban Interface priority areas. The actions described in Table 2.1 below will move the project area towards the desired condition by thinning, pile burning, pruning, cutting brush and prescribed burning approximately 653 acres. This alternative reduces catastrophic wildfire risk, improves conditions for fire to stay out of crowns and provides time for evacuations and firefighter safety if a large fire occurs. All mitigation measures described in the Mitigation section and Appendix A will be followed. (See Figures 2-1 and 2-2, Proposed Treatment Areas.)

Table 2-1 Alternative 2 – Vegetative Types and Treatments**Summary Table of Vegetation Treatments**

The following table summarizes vegetation types and treatments in Oak Creek Canyon. There are approximately 653 acres that have been identified for fuels treatment within the canyon. These treatment areas are shown by unit, parcel and recreation site identifiers on Figure 1

Unit (*)	Acres	Vegetation Type	Proposed Treatments
1	25	Ponderosa pine, Riparian, Chaparral, Oak	Thin pine under 9", thin oak up to 12", hand pile, pile burning, cut chaparral, Rx burning
2	19	Ponderosa pine, Chaparral	Thin pine under 9", cut chaparral, hand pile, pile burning, Rx burn
3	25	Ponderosa pine, Chaparral	Thin pine under 9", hand pile, pile burning, cut chaparral, Rx burn
4	26	Ponderosa pine, Chaparral	Thin pine under 9", hand pile, pile burning, cut chaparral, Rx burn
5	18	Ponderosa pine, Chaparral	Thin pine under 9", hand pile, pile burning, cut chaparral, Rx burn
6	4	Ponderosa pine, mixed conifer	Thin pine under 9", hand pile, pile burning, Rx burning
7	10	Ponderosa pine	Thin pine under 9", hand pile, pile burning, Rx burn
8	37	Ponderosa pine, Chaparral, Oak, Juniper	Thin pine under 9", thin oak up to 12", thin juniper, cut chaparral, hand pile, pile burning, Rx burn
9	10	Ponderosa pine, Chaparral, Oak, Juniper	Thin pine under 9", thin oak up to 12", thin juniper, cut chaparral, hand pile, pile burning, Rx burn
10	36	Chaparral, Oak, Juniper	Thin oak up to 12", cut chaparral, thin juniper, hand pile, burn piles, Rx burn
11	68	Ponderosa pine, Chaparral, Oak, Juniper	Thin pine under 9", thin oak up to 12", thin juniper, cut chaparral, hand pile, pile burning, RX burn
12	56	Chaparral , Oak, Juniper	Thin oak up to 12", cut chaparral, thin juniper, hand pile, burn piles, Rx burn
13	39	Chaparral, Oak, Juniper	Thin oak up to 12", cut chaparral, thin juniper, hand pile, burn piles, Rx burn
14	57	Chaparral, Oak, Juniper, Riparian	Thin oak up to 12", cut chaparral, thin juniper, hand pile, burn piles, Rx burn
15	28	Chaparral, Juniper	Cut chaparral, thin juniper, hand pile, burn piles, Rx burn
Total	458		

****Unit numbers or parcels correspond to numbers on Map of Proposed Treatments***

****Fuel treatments shown below will encompass up to 200 feet around private land and State Park. Topography may limit treatments to fewer than 200 feet. Acres treated are not depicted around individual parcels; however, total acres have been estimated.**

Parcel (**)	Vegetation	Proposed Treatments
Pine Flats	Ponderosa pine, Mixed conifer	Thin pine under 9", hand pile, burn piles, Rx burn
Thomas/Miller	Ponderosa pine, Chaparral	Thin pine under 9", cut chaparral, hand pile, burn piles, Rx burn
Call of the Canyon	Ponderosa pine, Mixed conifer	Thin pine under 9", hand pile, burn piles, Rx burn
Don Hoel's	Ponderosa pine, Mixed conifer, chaparral	Thin pine under 9", cut chaparral, hand pile, burn piles, RX burn
Junipine	Ponderosa pine, Juniper, Chaparral	Thin pine under 9", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Garlands	Ponderosa pine, Oak, Juniper, Chaparral,	Thin pine under 9", thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Slide Rock State Park	Ponderosa pine, Oak, Juniper, Chaparral	Thin pine under 9", thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Mission Rancho	Oak, Juniper, Chaparral	Thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Twin Oaks	Oak, Juniper, Chaparral	Thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Indian Gardens	Oak, Juniper, Chaparral, Riparian	Thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn, remove dead material and minor thinning in riparian
Twin Springs	Oak, Juniper, Chaparral	Thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Rainbow Trailer Park	Oak, Pinyon/Juniper, Chaparral, Riparian	Thin oak up to 12", thin P/J, cut chaparral, hand pile, burn piles, Rx burn, remove dead material and minor thinning in riparian
TOTAL	164 Acres	

(##) Fuel treatments will encompass up to 200 feet around developed recreation sites. Topography may limit treatments to fewer than 200 feet. Acres treated are not depicted for

individual sites; however, total acres have been estimated. Dev Rec Sites correspond to Developed Recreation Sites named on Maps of Proposed Treatments.

Recreation Sites (##)	Vegetation	Proposed Treatments
Pine Flats C.G.	Ponderosa pine, Mixed conifer	Thin pine under 9", hand pile, burn piles, RX burn
Cave Springs C.G.	Ponderosa pine, Chaparral	Thin pine under 9", cut chaparral, hand pile, burn piles, Rx burn
Bootlegger C.G.	Ponderosa pine, Oak, Juniper, Chaparral	Thin pine under 9", thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Banjo Bill P.G.	Ponderosa pine, Oak, Juniper, Chaparral	Thin pine under 9", thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Halfway P.G.	Oak, Juniper, Chaparral	Thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Manzanita C.G.	Ponderosa pine, Oak, Juniper, Chaparral	Thin pine under 9", thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
Encinoso P.G.	Oak, Juniper, Chaparral	Thin oak up to 12", thin juniper, cut chaparral, hand pile, burn piles, Rx burn
TOTAL	29 acres	

Fuel treatments would be completed on approximately 653 acres. Mitigation measures would be used to minimize concerns related to various resources. These include avoiding fuel reduction activities within designated wilderness, mitigating impacts to Mexican spotted owl and other sensitive species habitat, and buffering riparian corridors. The larger areas are identified on the map found in Appendix B, but some are too small to show up on the map. The fuel reduction activities will be accomplished by vegetation type as stated below and methods for cutting and disposal of vegetation and dead/down material would include chainsaw cutting, thinning and pruning, hand piling and burning, chipping, crushing, yarding of material for off-site disposal, under-burning and broadcast burning. The specific methods to be used on any given site would be selected during neighborhood planning based on forest conditions, visual considerations, the preferences of the neighborhood plan collaborators, and the neighborhoods desired future condition. Multiple treatment entries may be necessary to complete project objectives.

- Ponderosa pine, mixed conifer and oak woodlands:
 - Treatments will be within 200 feet of private property boundaries, developed recreation sites and on additional acres where less than 40% slopes exist, excluding designated Wilderness areas.
 - Treatments include:
 - Mechanical thinning of understory (trees less than 9 inches in diameter,) to approximately 60 square feet basal area
 - Removal of dead, standing and downed trees of any size, up to number of trees required to remain for wildlife habitat needs
 - Remove ladder fuels by pruning lower limbs on remaining trees and cutting brush species,
 - Chipping slash,
 - Hand-piling slash,
 - Burning of the slash piles,
 - Prescribed understory burning is included as part of initial treatments. All improvements that could be affected during prescribed fire treatments will be mitigated by hand lines, fire suppression staff presence, or foam and water.
 - Prescribed understory maintenance burning 3-10 years after initial treatments.
 - Within the 200 feet of private property and developed recreation sites (excluding designated Wilderness areas), variation from above treatments include:
 - Where slopes are greater than 40 percent, thinning will be limited to areas where footing for personnel is secure, trees will not roll into private property or structures and will not destabilize slopes. Basal area in these sites will likely remain higher than 60 square feet per acre.
 - Prescribed understory initial and maintenance burns would not be done on slopes greater than 40 percent.

These treatments will reduce crown density, which provides space between tree crowns. In addition, treatments will reduce the quantity and arrangement of surface and ladder fuels, smaller branches and limbs and brush species. This will reduce fire intensities in treated areas, increase control capabilities, and lessen the risk to firefighters during wildfire events. These types of vegetative treatments followed with prescribed burning will produce a mosaic effect on the landscape.

- Chaparral:
 - Treatments will be within 200 feet of private property boundaries and developed recreation sites, and additional sites where slopes are less than 40%, but not within designated Wilderness. Treatments include:
 - Mechanical hand cutting of chaparral to a height of one foot from ground level. Edges of clearing will be feathered or varied to prevent linear appearance.
 - Chipping.
 - Piling of slash.
 - Burning of piles.

- Prescribed broadcast burning in areas where ground litter is conducive for carrying fire.
- Mechanical hand cutting, piling and pile burning of regrowth to maintain clearing will be done on a 3-10 year rotation.
- Mechanical crushing.

These treatments will provide a fuel break between private property and continuous chaparral fields. This provides a buffer to reduce fire intensities in treated areas, increase control capabilities, and lessen the risk to firefighters during wildfire events

- Juniper woodlands:
 - Treatments will be within 200 feet of private property boundaries, developed recreation sites, and additional sites where slopes are less than 40%, but not within designated Wilderness. Treatments include:
 - Mechanical thinning of stands, including dead, standing trees, to 40 square feet basal area to remove ladder fuels.
 - Removal of dead, standing trees of any size, up to number of trees required to remain for wildlife habitat needs.
 - Cutting of brush species within this vegetation type.
 - Chipping.
 - Hand-piling.
 - Burning of piles.
 - Maintenance activities on a 3-10 year cycle, includes cutting of returning brush and small trees and broadcast burning.
 - Lop and scatter in limited situations.
 - Within 200 feet of private property and developed recreation sites (excluding designated Wilderness areas), variation from above treatments include:
 - Where slopes are greater than 40 percent, thinning will be limited to areas where footing for personnel is secure and will not destabilize slopes.
 - Retention of cypress trees over other species when possible during thinning activities.

The treatments in juniper woodlands will reduce crown densities and the quantity and arrangement of surface and ladder fuels. This will reduce fire intensities, increase control capabilities, and lessen risks to firefighters in the event of wildfires.

Comparison of Alternatives

This section compares outputs, objectives and effects of the alternatives in terms of the significant issues for the Oak Creek Fuel Reduction project. The discussions of effects are summarized from Chapter 3, which should be consulted for a full understanding of these and other environmental consequences. Table 2-2 provides an overview comparison of information from the alternative descriptions and Chapter 3 relevant to the issues. This information will be used in the discussions which follow.

TABLE 2-2: Comparison of Alternatives

	Alt. 1 No Action	Alt. 2 Proposed Action
Basal area (X sq. ft.)	100-200 square feet in ponderosa pine areas, some areas are higher.	60 square feet in ponderosa pine treatment areas
Soil and Water	No change from current conditions however, potential for a wildfire situation that could result in unstable soils and potential for degraded water quality conditions.	With BMP's and mitigation measures there should be no impacts to soils or water quality from treatments.
Recreation	Recreation activities and experiences continue as existing except potential for a wildfire that could result in damage and restrictions or closures of facilities.	Recreation activities and experiences continue as existing. Some change in recreation setting may occur as evidence of treatments is visible within and adjacent to recreation sites. More open forest setting is typically more desirable to the general public.
Air Quality	No new impacts except during likely wildfire events.	Short Term smoke impacts during burning. Coordination for burning with ADEQ.
Heritage Resources	No direct impact to sites. Potential for impacts resulting from a wildfire event.	No effect to known sites with monitoring and mitigation measures.
Visual Resources	No change in existing visual conditions. Primarily natural appearing setting.	Short-term changes to natural appearance of treatment areas. Mitigation will minimize impacts but treatments will be visible in areas.
Management Indicator species	No change in existing conditions, unless large wildfire event occurs which could result in more severe impacts to habitat.	Some impacts to MIS species but no change to forest trends.
Special Status Species	No change in existing conditions, unless large wildfire event occurs which could result in more severe impacts to habitat.	While there may be impacts to species during treatments activities, there is long term benefit to treatments for many species and to reduce potential for large wildfire impacts.
General Wildlife	No change in existing conditions, unless large wildfire event occurs which could result in more severe impacts to habitat.	While there may be impacts to species during treatments activities, there is long term benefit to treatments for many species and to reduce potential for large wildfire impacts.

Chapter 3 – Affected Environment and Environmental Consequences

Introduction

This chapter provides information concerning the affected environment of the Oak Creek Fuel Reduction project area, and potential consequences to that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. All effects, including direct, indirect and cumulative effects, are disclosed. Effects are quantified where possible, and qualitative discussions are also included. The means by which potential adverse effects will be reduced or mitigated are described (see also Chapter 2, and Appendix A).

The discussions of resources and potential effects take advantage of existing information included in the Coconino Forest Plan's FEIS, other project EA's OR EIS's, project-specific resource reports and related information, and other sources as indicated. Where applicable, such information is briefly summarized and referenced to minimize duplication. The planning record for the Oak Creek Fuel Reduction project includes all project-specific information, including resource reports, the watershed analysis, and other results of field investigations. The record also contains information resulting from public involvement efforts. The planning record is located at the Red Rock Ranger District Office in Rim Rock, Arizona, and is available for review during regular business hours. Information from the record is available pursuant to the Freedom of Information Act.

Environmental Effects of the Significant Issues

Air Quality

Affected Environment In general, air quality over the project is very good, with some exceptions. In the fall and winter, inversions may occur, trapping pollutants from wood burning and other local pollutants in the Verde Valley. During the summer months, industrial pollutants from Phoenix drift over the Verde Valley. The project area is adjacent to the Secret Mountain Wilderness Area to the west. The wilderness area is a Class 1 Airshed, an area where air quality requires protection.

No Action Alternative: The risk of large-scale wildfire is greatest under this alternative. Wildfire would have a much larger impact on air quality than prescribed fire due to higher burning intensities and production of smoke over a much shorter period of time. A large wildfire occurring during summer months could burn for several days and produce significant smoke impacts to several communities in the area including Sedona, Village of Oak Creek, Clarkdale, Cottonwood and Camp Verde. However there would be no air quality impacts as a result of prescribed fire activities since they would not occur in this alternative.

Proposed Action Alternative: Local air quality would be temporarily impacted during the implementation of various project area treatments. The amount of smoke and its affect on the public would be minimized as much as possible by implementing known strategies and tactics, and by utilizing the ADEQ established procedures. No burning would occur prior to obtaining a permit from ADEQ, and this would be done on a daily basis to allow for changing atmospheric conditions. Mechanized equipment could produce emissions from internal combustion engines and dust during implementation but it is short term and only during operations. Burning slash piles, under-burning and broadcast burning will produce smoke that will be visible to the communities mentioned above; however, these effects can be mitigated by burning small areas

during favorable weather conditions and coordinating closely with the Arizona Department of Environmental Quality. A site specific Burn Plan would be developed to include procedures for minimizing smoke impacts. The proposed action would be in compliance with all Arizona State and federal emissions and smoke management regulations. Ignition techniques could be changed or halted immediately if smoke impacts exceeded the state or federal regulations. Typically, ignitions stop prior to 1:00 PM to allow for good dispersion of smoke.

There are no cumulative effects from the No Action alternative related to air quality since no prescribed burning or mechanical actions would occur. However, if a large wildland fire occurs in the project area, there could be adverse cumulative effects to air quality until the fire is controlled. Under the Proposed Action, there would be temporary cumulative air quality effects additive to existing vehicle emissions, campfire and wood stove smoke and other prescribed burning activities in adjacent forest areas during treatments. Added emissions from equipment use would be minimal. Close coordination with ADEQ and monitoring of smoke dispersal should maintain air quality within standards during treatments. However, there will be concerns from those with smoke sensitivity and health issues related to air quality during implementation of both pile burning and broadcast maintenance burning.

Heritage Resources

Affected Environment: The proposed project area consists of approximately 8,500 acres; however, only approximately 653 acres are actually proposed for treatment. Approximately 541.7 acres (83%) of the proposed treatment areas were previously surveyed as part of 47 prior projects.

These surveys have resulted in the documentation of 34 historic sites, six prehistoric sites, and one prehistoric site with a historic component within the 8,500 acres planning area; of these 25 will require some level of protection and monitoring. In addition, seven undocumented historic linear sites (six trails and one old road) are also known within or adjacent to the project area.

No Action Alternative: Under this alternative there would be no treatments and no potential for disturbances from treatment activities. The existing condition however, which threatens the modern urban interface, also threatens archaeological resources with an undesirable level of damaging fire effects such as scorching, charring, smoke-blackening, oxidation rinds, complete combustion of artifacts, alteration/contamination and destruction of potential dating samples, as well as post fire erosion.

Proposed Action Alternative: The proposed project will reduce the potential for uncharacteristically large fires and associated fire behavior around the urban interface and will also help minimize damage to archaeological sites and better preserve archaeological material remains over the long term. There are several sites that are eligible for listing on the National Register within the project area. Mitigation measures and monitoring are specified in the archeological Inventory Standards and Accounting Form for these sites and for areas where survey work has not been completed. The State Historic Preservation Office concurred with the Conditions of Clearance and these conditions, including identified monitoring, will be followed prior to and during implementation of annual treatment activities.

There would be no cumulative effects from the No Action alternative since no treatments would occur. However, potential wildland fire could result in impacts to sites as described in the No action alternative above. The Proposed Action should not have direct effects and therefore no cumulative effects to cultural resources if mitigation measures are followed for treatment actions.

Vegetation and Fuels

Affected Environment: The project area is identified as wildland-urban interface (WUI), it is in an area where flammable wildland fuels are near homes and communities. WUI areas are identified as one of the highest priorities for treatment. Fire interval is dependent on vegetation type. There are four distinct vegetation types with differing fire return potential (Ponderosa pine/mixed conifer, chaparral, pinyon juniper and riparian.) Studies conducted in early 2004 indicate that Oak Creek Canyon is generally considered to be in Fire Regime III where fire intervals are between 35 -100 years with a mix of fire severity. Additionally, this same area is considered to be in Condition Class 3 where the fire regime has been significantly altered from its historic interval range. See the specific description of existing conditions in Chapter 1. Conditions in the project area are identified in the Community Wildfire Protection Plan for Flagstaff and Surrounding Communities as being high risk and high threat.

No Action Alternative: Under the No Action Alternative, fuel management activities to manipulate vegetation structure, composition and patterns in order to provide for private and public lands and firefighter safety would not occur in the proposed treatment areas. The project area would remain as described in the Existing Condition section, and current trends would continue. Vegetation would continue to grow more densely, accumulating more dead and live fuels. The potential for uncharacteristically intense and severe wildfires would not be abated. Resistance to fire control would increase, while the ability to provide for public and firefighter safety and structure protection would continue to decrease.

Proposed Action Alternative: In this alternative, opportunities exist to reduce hazardous fuel accumulations by reducing the amounts of live and dead vegetation in specific areas, primarily adjacent to private land, developed recreation sites and other strategically significant areas. The proposed vegetative treatments as described will provide for a mosaic pattern of different age classes, vegetative densities and horizontal and vertical fuels arrangements. This is intended to break up fuel continuity and reduce intense fire behavior adjacent to private property, developed recreation facilities and Highway 89A. These breaks in the fuels will be large enough in most cases to be an effective tactical advantage to firefighters but not large enough to cause any adverse affects. Old growth in the project area would not be impacted because trees no larger than 12 inches diameter will be removed in this project.

Under the No Action alternative, there are no cumulative effects since there would be no treatments occurring. However, intense wildfires could impact vegetation extensively in the project area. The Proposed Action alternative would result in removal of vegetation that is additive to residential development in the area and highway construction projects. Cumulatively, this action would move the vegetation in treatment areas to a healthier and more natural vegetative condition, unlike other vegetation actions within the project area which are more focused on removal to accomplish other goals. Cumulatively, the treatment acreage is very small, about 8 percent of the WUI area, and will result in only limited changes in vegetation.

Rangeland Resources

There are currently no livestock permitted to graze National Forest System Lands within the project area. Therefore there are no effects, direct, indirect or cumulative from either alternative.

Noxious and Invasive Plants

Affected Environment: Survey work has been completed in locations within the project area and weeds do exist particularly along roadway corridors and on adjacent private property. The Coconino, Kaibab and Prescott National Forest Noxious Weed Strategic Plan Working Guidelines Update – Integrated Weed Management Practices are being used as direction for implementing projects and taking eradication actions.

No Action Alternative: The No Action alternative will not result in changes in the spread of noxious weeds in the project area. Most noxious weeds found during surveys for this proposed project were located on or adjacent to private land or along highway corridors and project areas.

Proposed Action Alternative: Under the Proposed Action Alternative there will be little or no opportunity to affect the current location and distribution of noxious weeds on private property. There are however, opportunities to address the infestations on National Forest lands. The current weed survey will be used to locate and identify noxious weeds for potential pre-treatment, use of fire treatment and post-treatment activities. If mechanized equipment or contractors are utilized the Coconino, Kaibab and Prescott National Forest Noxious Weed Strategic Plan Working Guidelines Update – Integrated Weed Management Practices will be adhered to in an effort to reduce any further spread of noxious weeds.

The No Action alternative will not result in cumulative effects on invasive species, since there would be no effects from that alternative. The Proposed Action alternative should not

Recreation

Affected Environment: The project area includes high public use developed and dispersed recreation sites that are very popular throughout the year, including use by tour buses and school groups. There are 12 developed recreation sites including four campgrounds, two swim areas, 3 picnic areas, two scenic vista sites and the West Fork Trailhead. In addition, this area includes 10 designated trails, several that provide entry portals to the Red Rock Secret Mountain Wilderness. Traffic volumes through the project area on State Route 89A are heavy and a key recreation activity is driving to enjoy the scenic beauty of the area along the designated state scenic highway corridor and enjoying the riparian setting and water based day use activities. The Recreation Opportunity Spectrum (ROS) for this area is Roaded Natural. There are two eligible wild and scenic river segments within the project area: one is the upper portion of Oak Creek and one is West Fork of Oak Creek. Outstandingly remarkable values for these segments include scenic, recreation, geologic, fish and wildlife, historic, and ecological.

No Action Alternative: The No Action Alternative will not change existing recreation uses and activities from occurring within the Project Area. However, large wildfires, such as the Brins Fire, have the potential to limit recreation access and impact facilities both during and after these events. There would be no changes to ROS characteristics. Trail and area closures are common after wildfire events in order to address safety concerns. There would be no changes to outstandingly remarkable values to eligible river segments with the no action alternative unless there is a catastrophic fire which would have the potential to impact all of the remarkable values associated with these river segments.

Proposed Action Alternative: The Proposed Action Alternative will require coordination to provide for the least conflict between visitors and management activities. Location and timing of activities near developed recreation facilities and trails will be closely coordinated to provide for visitor and employee safety and to reduce or eliminate any potential conflict. It is anticipated that work near developed recreation areas can be accomplished during off season times or when these

facilities are closed. There could be short term changes to the existing recreation character as a result of unnatural appearing slash piles near recreation sites but these would not be outside the ROS Roded Natural objective since this objective indicates there would be man-made facilities visible in the area. There would be no impacts to the outstandingly remarkable values of the West Fork of Oak Creek eligible Wild and Scenic River segment. There could be short term scenic impacts in small areas along the Oak Creek segment of eligible wild and scenic river. With mitigation, outstandingly remarkable values are not impacted in the long term.

There would be no cumulative effects from the No Action alternative since no treatments would occur. The Proposed Action alternative would result in temporary changes to the recreation setting additive to other actions within the project area including highway work, residential development and trail and area closures from the Brins fire. Cumulatively there would be short term changes to a more primitive setting adjacent to developed recreation sites during between tree thinning activities and before slash piles are burned however there would not be long term cumulative effects from treatments. Overall treatments will likely result in more desirable recreation setting for most people by creating more open park-like stands of vegetation, as well as better protecting recreation sites and visitors if a large wildfire occurs.

Visual Resources

Affected Environment: Scenic integrity measures the degree to which a landscape is visually perceived to be “complete.” The scenic integrity of Oak Creek Canyon is currently affected by five main factors: construction of large homes out of scale with the surrounding character; commercial developments; developments on public lands; highway development; and vegetation management. The cumulative existing scenic integrity is “high.” Elements that currently detract from the scenic integrity and prevent a “very high” rating are out of the control of the Forest Service. The current conditions of Oak Creek Canyon vegetation are primarily natural appearing. Exceptions to this include pruning along the APS powerline, ADOT and other utility/travel corridors, the existence of historic orchards and the landscaping of private property. While not completely natural appearing, historic orchards and private landscaping are considered valued cultural elements. Concern levels measure the expectations, desires and preferences of the viewer. Oak Creek Canyon has the highest concern levels of anywhere on the National Forest. Thirteen miles of State Highway 89A North run through Oak Creek Canyon and provide access for millions of visitors each year to view the scenery and experience the canyons unique landscape features.

No Action Alternative: Under the no-action alternative, cumulative scenic integrity would remain “high” until such time that a catastrophic fire occurs in the Canyon. It is likely that the impacts of a catastrophic fire would be visible from many Canyon locations. The visual effects of a catastrophic fire would not mimic the natural vegetation mosaic that would have historically occurred. Such excessively large blackened landscapes are not generally valued for their scenic quality. The fire effects of a massive catastrophic fire with associated black zones would degrade the scenic integrity for the time period until revegetation occurs. Valued areas of large old growth ponderosa pine and oak would be lost. The natural and more visually appealing diversity of vegetation would be compromised. Due to the potential heat associated with a catastrophic fire, soils may be sterilized, thereby leaving the black, unvegetated zones for a longer time period. Soil erosion could also create slope instability and landslides that are also generally not valued for their scenic integrity and again likely result in a longer period of time for revegetation and natural setting to reestablish. In addition, emergency fire suppression actions such as fire lines and fire

retardant could leave lasting, unnatural appearing scars on the landscape, further degrading the scenic integrity to “moderate” or “low,” possibly for the long term. Extensive degraded areas would not meet Forest Plan objectives.

Proposed Action Alternative: With well-designed mitigation measures the cumulative effects associated with the proposed action can be expected to result in a “moderate” to “high” Scenic Integrity level. Efforts would be made when planning treatment blocks to avoid adverse visual affects. Treatment locations visible from the Highway, vistas and overlooks would be planned in such a manner to mimic natural openings and breaks in vegetation. Most of the planned treatment locations are small enough to go unnoticed. Other treatment areas still will provide relief from the vegetative continuity and actually help feature rock outcrops or vegetative species that may not otherwise be seen. As proposed (removal of 9”DBH and smaller trees), this treatment will result in more “open appearing” ponderosa pine stands. Due to the high existing basal area in these stands, there is a need to “feather” the edges of these treatments to avoid creating a contrast with adjacent untreated areas. With successful blending, the result of this treatment type is expected to be a visual enhancement through the creation of a more open stand of ponderosa pine, and ultimately larger ponderosa trees, which are valued by people for their scenic qualities. This treatment type is expected to reduce scenic integrity from “very high” to “high” for at least a year until ground disturbance is restored, stump cuts fade and piles are burned. Long term scenic integrity would remain “very high.” Areas mechanically treated and/or burned may have a reduced level of visual quality until new growth appears, or a new needlecast occurs.

Soils

Affected Environment:

Ponderosa Pine, Mixed Conifer, Oak Woodlands: Soils within the pine and mixed conifer vegetation types are primarily in map unit 0555 of the Terrestrial Ecosystem Survey (TES) of the Coconino National Forest (TES, 1991). They are moderately deep, occur primarily on greater than 40% slopes, have very cobbly/stony sandy loam surfaces, and have developed from sandstone and limestone. There is approximately 25% rock outcrop in the mapping unit. The pine are found more on the cobbly soil surfaces and the fir on the stony soil surfaces. Soils within the Oak Woodlands are primarily in map unit 0471 which is described in the Chaparral vegetation type section.

Chaparral vegetation type: This is the largest vegetation type in the project area, over 50% of the area. Soils in the southern half of the vegetation type are primarily in map unit 0470 of TES. They are moderately deep, occur on primarily greater than 40% slopes, have extremely stony fine textured soil surfaces, and have developed from basalt. There is approximately 20% rock outcrop in the mapping unit. Soils in the northern part of the vegetation type are primarily in map unit 0471. They are moderately deep, occur on primarily greater than 40% slopes, have stony sandy loam surfaces, and have developed from sandstone and limestone. There is approximately 50% rock outcrop in the mapping unit. This vegetation type includes shrub live oak and pointleaf manzanita as main components with a larger component of mountain-mahogany in map unit 0470 than in map unit 0471

Juniper Woodlands: – This vegetation type primarily occurs in the southernmost portion of the project area. Soils within this vegetation type are in map units 0458 and 0462 occurring on elevated plains/hills west of Oak Creek and in map units 0474 and 0475 occurring on elevated plains/hills east of Oak Creek. Soils in map unit 0458 are shallow/moderately deep, occur on slopes 15 to 40%, have gravelly sandy loam surfaces, and have developed from sandstone. Soils

in map unit 0462 are moderately deep/deep, occur on slopes less than 15%, have very cobbly/stony fine textured soil surfaces, and have developed from basalt. Soils in map unit 0474 are moderately deep, occur on slopes primarily less than 20%, have very coarse textured soil surfaces, and have developed from sandstone. Soils in map unit 0475 are shallow, occur on greater than 40% slopes, have cobbly sandy loam surfaces, and have developed from sandstone. There is approximately 40% rock outcrop in this mapping unit. Map unit 0474 has a moderate erosion hazard and the maintenance of a vegetative ground cover is essential to prevent sheet and rill erosion. There is a large component of Arizona cypress in map units 0474 and 0475.

Riparian zone vegetation type: Soils in the riparian zone are in map units 0046, 0056, and 0060, south to north. They are deep, have very bouldery surfaces, and have developed in mixed alluvium.

No Action Alternative: If no fuel treatments are undertaken, there would exist high potential for catastrophic wildfire in the canyon. There would be the potential for large acreages of vegetation loss from burn-off exposing surface soils. Exposed soils would be subjected to accelerated rates of erosion and soil loss primarily during summer rainfall events. Loss of soil would result in a reduction in soil productivity.

Proposed Action Alternative: Prior to any ground disturbing activities and treatments, appropriate Best Management Practices (BMP's) will be implemented to help mitigate any potential effects. The proposed annual treatments will be limited in acreage and extent. As result of the limited extent of treatments and the implementation of BMP's there will be no cumulative addition from the proposed action to any soil effects in the area.

Water Resources

Affected Environment: Oak Creek arises from a series of springs at the head of Oak Creek Canyon and flows south through the length of the project area. There are 3 main tributaries to Oak Creek within the project area: Pumphouse Wash, an intermittent tributary from the northeast; the West Fork of Oak Creek, a perennial stream from the west; and Munds Creek, a perennial stream from the east. Baseflow near the headwaters of Oak Creek is approximately 3-5 cubic feet per second (cfs). With tributary and groundwater contributions, baseflow increases to approximately 18 cfs at Slide Rock State Park and 24 cfs at the Sedona gage. There are numerous ephemeral side washes that convey water from the adjacent uplands to Oak Creek during rainfall events.

Arizona sets surface water quality standards for each waterbody based on the designated uses people and wildlife make of the water. All 6 State designated uses apply for Oak Creek in the project area. The designated uses are Aquatic & Wildlife coldwater (A&Wc), Fish Consumption (FC), Full Body Contact (FBC), Domestic Water Source (DWS), Agriculture-Irrigation (AgI), and Agriculture-Livestock Watering (AgL). There are 3 reaches of Oak Creek within the project area that are subject to water quality monitoring to determine if standards are met. Water quality monitoring results indicate that some designated uses are attaining and some are inconclusive. An inconclusive result typically means there has not been sufficient samples collected to Arizona Department of Environmental Quality (ADEQ) standards to determine if water quality in the reach is attaining or impaired, more samples will be collected. There is a 1-mile reach at Slide Rock State Park that is not attaining for FBC because of high levels of E. coli. A plan has been developed to establish the allowable Total Maximum Daily Loads (TMDLs) and is being implemented. Sampling for E. coli is conducted by Slide Rock State Park personnel to track

levels and in support of the requirements of the TMDL. The reach of Oak Creek from West Fork to below Sedona is rated as impaired for A&Wc due to high levels of turbidity. A request has been submitted to the Environmental Protection Agency to change the designated use to A&Ww, if granted, this reach would be in attainment.

The Arizona Surface Water Quality Standards classify Oak Creek as a Tier II Unique Water subject to special protection and standards. The Unique Water designation and associated Anti-degradation Rule have been interpreted by ADEQ to preclude any new or additional pollutant sources in Oak Creek.

No Action Alternative: If no fuel treatments are undertaken, there would exist high potential for catastrophic wildfire in the canyon. If this occurred there could be large acreages of vegetation loss and resultant soil erosion. The steep canyon slopes with accelerated rates of erosion would result in high levels of sediment delivery to Oak Creek and adjacent private property. High levels of sediment would result in impairment to Oak Creek water quality.

Proposed Action Alternative: Under the Proposed Action there would be limited vegetation treatments and no burning activities in riparian areas. Prior to any ground disturbing activities and treatments, appropriate BMP's will be implemented to help mitigate any potential affects. The annual proposed treatments will be limited in acreage. As a result of the limited extent of annual treatments and the implementation of BMP's there will be no cumulative addition from the proposed action to any water quality impact to Oak Creek and it's tributaries. Mitigation measures limited burning activities near primary and secondary drainages should provide a vegetative strip to filter sediment out prior to entering the riparian corridor and into Oak Creek as sediment. There should be no effect on Oak Creek water quality from this treatment. There could be some potential for sediment delivery to Oak Creek from treatments in chaparral and sandy soils in juniper areas during a high intensity monsoon storm event. If this occurred the effect to Oak Creek water quality from sediment delivery would be short term.

Wildlife and Fish

Affected Environment:

Special Status Species: A total of 39 special status species are know to occur or have existing or potential habitat within the Oak Creek Canyon project area. Special status species include those species federally listed or proposed under the Endangered Species Act (ESA), species listed as candidates for listing under the ESA, species designated as Forest Service sensitive by the Regional Forester, and species identified as management indicator species (MIS) for the Coconino National Forest Land and Resource Management Plan. Seven threatened or endangered species that are known to occur, have existing or potential habitat within Oak Creek Canyon, or occur downstream of Oak Creek Canyon include bald eagle (*Haliaeetus leucocephalus*), Mexican spotted owl (*Strix occidentalis lucida*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), loach minnow (*Tiaroga cobitis*), spikedace (*Meda fulgida*), and Gila trout (*Oncorhynchus gilae gilae*). Other rare wildlife species that are known to occur, or have existing or potential habitat include 2 candidate species, 20 sensitive species, and 11 MIS, 1 of which is also listed (see Table 3-1 below). In addition to special status species, general wildlife and neotropical migratory birds are also addressed. The Biological Assessment and Evaluation is included in its entirety in the Project Record.

Amphibian and reptiles in Oak Creek Canyon include several species of toads, frogs, lizards, and snakes. Common amphibians include canyon tree frogs and lowland leopard frogs. Numerous

species of lizards occur in the area; horned lizards, zebra-tailed lizards, collared lizard, side-blotched lizards, spiny lizards, skinks, alligator lizards, and whiptails. Snake species that occur in the area include: various garter snakes such as the narrow-headed, black-necked, and wandering; whip snakes; king snakes; gopher (bull) snake; and rattlesnakes such as the Arizona black and black-tailed.

Oak Creek supports a variety of native as well as non-native (introduced) species. Native species include Sonoran sucker, Desert sucker, Longfin dace, and Speckled dace. Introduced fish species include rainbow trout, brown trout, small-mouth bass, blue and green sunfish, carp, and catfish.

There are many species of birds that occur in Oak Creek Canyon. The majority of these birds are passerines but other groups of birds include waterfowl, wading birds, fowl-like birds, raptors, and miscellaneous non-passerine birds such as kingfishers, pigeons, doves, hummingbirds, and woodpeckers. Many of the birds in Oak Creek Canyon are neotropical migrants and spend only a portion of each year (spring and summer) in this area.

Game species in Oak Creek Canyon include elk, mule deer, white-tailed deer, bear, mountain lion, bobcat, fox, coyote, javelina, rabbits, raccoons, and squirrels. Non-game mammal species include bats, mice, rats, voles, gophers, woodrats, skunks, ring-tailed cats, coatimundis, among others. Also numerous species of bats occur in Oak Creek Canyon.

No Action Alternative: The No Action alternative will not result in direct impacts to plant and animal species or their habitats. However, the No Action alternative has the highest potential for adverse effects to aquatic, riparian and upland species of plants and animals. The lack of treatment does not reduce the risk of catastrophic wildfire, which could result in a much higher loss of habitat for most species than that which would occur under the Action Alternative.

Proposed Action Alternative: The Oak Creek Canyon Wildland Urban Interface project area provides a variety of habitat types that support an abundance of wildlife. The habitat types found in Oak Creek Canyon include mixed conifer, ponderosa pine, pinyon/juniper, chaparral, and riparian. This diversity of vegetation types in Oak Creek Canyon supports hundreds of species reptiles, amphibians, fish, birds, and mammals.

Table 3-1: Special Status Species in Oak Creek Canyon WUI Analysis Area

<i>Common Name</i>	<i>Scientific Name</i>	Status	Project effects
Federally Listed (End, Thr, Proposed) (7)			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T,WC,Sen	MNLA
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	T,WC,Sen,MIS	MAA
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	E, WC, Sen	MNLA
Razorback Sucker	<i>Xyrauchen texanus</i>	E, WC, Sen	MNLA

<i>Common Name</i>	<i>Scientific Name</i>	Status	Project effects
Loach Minnow	<i>Tiaroga cobitis</i>	T, WC, Sen	MNLA
Spikedace	<i>Meda fulgida</i>	T, WC, Sen	MNLA
Gila Trout	<i>Onchorhynchus gilae gilae</i>	E, WC, Sedn	MNLA
Sensitive Mammals (1)			
Southwestern River Otter	<i>Lutra canadensis Sonora</i>	SC, WC, Sen	MI
Sensitive Birds (3)			
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	WC, Sen	MI
Common Black Hawk	<i>Buteogallus anthracinus</i>	WC, Sen, MIS	MI
Western Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	C, WC, Sen	MI
Sensitive Amphibians (1)			
Lowland Leopard Frog	<i>Rana yavapaiensis</i>	SC, WC, Sen	MI
Sensitive Reptiles (3)			
Narrow-headed Garter Snake	<i>Thamnophis rufipunctatus</i>	SC, WC, Sen	MI
Mexican Garter Snake	<i>Thamnophis eques megalops</i>	SC, WC, Sen	MI
Arizona Night Lizard	<i>Xantusia vigilis arizonae</i>	Sen	MI
Sensitive Invertebrates (7)			
Freeman's Agave Borer	<i>Agathymus baueri freemani</i>	Sen	MI
Neumogen's Giant Skipper	<i>Agathymus neumoegei</i>	Sen	MI
Aryxna Giant Skipper	<i>Agathymus aryxna</i>	Sen	MI
Obsolete Viceroy Butterfly	<i>Limenitis archippus obsolete</i>	Sen	MI
Early Elfin	<i>Incisalia fotis</i>	Sen	MI
Comstock's Hairstreak	<i>Callophrys comstocki</i>	Sen	MI
Spotted Skipperling	<i>Piruna polingii</i>	Sen	MI
Sensitive Fish (1)			

Chapter 3 – Affected Environment and Environmental Consequences

<i>Common Name</i>	<i>Scientific Name</i>	Status	Project effects
Roundtail Chub	<i>Gila robusta</i>	SC, WC, Sen	NI
Sensitive Plants (6)			
Eastwood Alumroot	<i>Heuchera eastwoodiae</i>	Sen	MI
Flagstaff Penstemon	<i>Penstemon nudiflorus</i>	Sen	MI
Cliff Fleabane	<i>Erigeron saxatilis</i>	Sen	NI
Flagstaff Pennyroyal	<i>Hedeoma diffusum</i>	Sen	MI
Milk-Vetch	<i>Astragalus rusbyi</i>	Sen	MI
Arizona Bugbane	<i>Cimicifuga arizonica</i>	C, Sen	MI
Other Management Indicator Species (11)			
Macro-invertebrates	-----	MIS - Riparian	MI
Yellow-breasted Chat	<i>Icteria virens</i>	MIS – Riparian	NC
Lucy’s Warbler	<i>Vermivora luciae</i>	MIS – Riparian	NC
Hairy Woodpecker	<i>Picoides pubescens</i>	MIS – Riparian	NC
Juniper (plain) titmouse	<i>Baeolophus griseus</i>	MIS – P/J	NC
Turkey	<i>Meleagris gallopavo</i>	MIS – MC/PP	NC
Mexican spotted owl	<i>Strix occidentalis lucida</i>	MIS – MC/PP	NC
Pygmy nuthatch	<i>Sitta pygmaea</i>	MIS – MC/PP	NC
Elk	<i>Cervus elaphus</i>	MIS – MC/PP	NC
Abert squirrel	<i>Sciurus abertii</i>	MIS – MC/PP	NC
Mule deer	<i>Odocoileus hemionus</i>	MIS – P/J	NC

Common Name	Scientific Name	Status	Project effects
Table Legend			
<u>Species Status:</u>			
E	= Federally listed as Endangered under Endangered Species Act (ESA)		
EXNE	= Federally Endangered, Experimental, Non-essential		
T	= Federally listed as Threatened under ESA		
P	= Federally Proposed for listing under the ESA		
C	= Federally designated as Candidate for listing		
WC	= Wildlife of Special Concern in Arizona (AGFD draft 3/16/96)		
Sen	= On Regional Forester’s Sensitive Species List (7/21/99)		
MIS	= Coconino Management Indicator Species from the Forest Plan		
SC	= Federal Species of Concern (former C2 species).		
<u>Project Effects:</u>			
MAA	= May adversely affect		
MNLA	= May affect, not likely to adversely affect		
MI	= May impact but is not likely to result in a trend toward federal listing or loss of viability		
NI	= No impact		
NC	= No change to Forest Trend		

Environmental Consequences -- Amphibians and Reptiles

Vegetative treatments in Oak Creek Canyon can influence water quality by altering temperature, suspended sediments, dissolved oxygen, and nutrients. The use of prescribed fire can affect aquatic herps (amphibians and garter snakes) and their habitat through the modification of water quality and quantity. Sediment, ash, and debris deposition into the stream affects nutrient, temperature, and sediment levels in the water.

The deposition of ash, sediment, and debris into Oak Creek could adversely affect populations of amphibians and aquatic reptiles without proper mitigation. Therefore, it has been determined that fuel reduction activities (mechanical treatment and prescribed burning) will not occur within the riparian zones associated with perennial and major ephemeral drainages, no prescribed burning will occur within a 150 foot buffer adjacent to the riparian areas, and prescribed burning will not occur within 50 feet of ephemeral side drainages. These mitigation measures have been deemed

appropriate to effectively reduce the risk of changes in water quality and quantity that may adversely affect aquatic species.

Mechanical reduction of fuels and prescribed burning in the woodlands and crushing and strip burning activities in the chaparral vegetation type may directly affect upland reptiles and their habitat resulting in displacement, mortality, and loss of shelter substrate. The retention of downed logs will protect some shelter substrate, however, downed logs less than 12 inches midpoint diameter may be removed or burned. Reptiles and upland amphibians are capable of withstanding the effects of fires (particularly prescribed fires which will be conducted as cool burns) by seeking refuge under rocks, in moist depressions, and under stumps and downed logs. Reptiles are fairly mobile and since treatments will be contained to fairly small areas at any one time, some individuals will be capable of successful dispersal from the site during treatment activity.

Environmental Consequences -- Fish: Vegetative treatments in Oak Creek Canyon can influence water quality by altering temperature, suspended sediments, dissolved oxygen, and nutrients. The use of prescribed fire can affect fish and their habitat through the modification of water quality and quantity. Sediment, ash, and debris deposition into the stream affects nutrient, temperature, and sediment levels in the water.

The deposition of ash, sediment, and debris into Oak Creek could adversely affect populations of fish species without proper mitigation. Therefore, it has been determined that fuel reduction activities (mechanical treatment and prescribed burning) will not occur within the riparian zones associated with perennial and major ephemeral drainages, no prescribed burning will occur within a 150 foot buffer adjacent to the riparian areas, and prescribed burning will not occur within 50 feet of ephemeral side drainages. These mitigation measures have been deemed appropriate to effectively reduce the risk of changes in water quality and quantity that may adversely affect aquatic species.

Environmental Consequences -- Birds:

There are many species of birds that occur in Oak Creek Canyon. The majority of these birds are passerines but other groups of birds include waterfowl, wading birds, fowl-like birds, raptors, and miscellaneous non-passerine birds such as kingfishers, pigeons, doves, hummingbirds, and woodpeckers. Riparian dependent birds include American dipper, painted redstart, black phoebe, and yellow warbler. Those upland birds dependent on snags and cavities for nesting include northern flicker, hairy woodpecker, house wren, and mountain chickadee. Upland birds that nest among the branches of mature trees include plumbeous vireo, western tanager, hooded oriole, hepatic tanager, sharp-shinned and Cooper's hawks, band-tailed pigeons, Stellar's jay, and brown creepers. Several species, such as the black-chinned sparrow and spotted towhee, nest in mid-story vegetation such as shrubs. The Virginia's warbler and dark-eyed junco nest on ground. Cliff and rock nesters include canyon wren, white-throated swifts, violet-green swallows, and the common raven.

Many of the birds in Oak Creek Canyon are neotropical migrants and spend only a portion of each year (spring and summer) in this area. These birds travel each year from their wintering grounds in Mexico, Central and South America, and the Caribbean to North America to breed during the spring and summer months. Precipitous declines in neotropical migratory bird populations have occurred over the last twenty years and are caused mainly by habitat loss and modification in the wintering grounds, breeding grounds, and along migration routes.

Riparian obligate bird species would only experience indirect effects from the treatment alternative, as there will be no treatment within 150 feet of riparian areas. Indirect effects include visual and aural disturbance from crews and equipment, and disturbance from smoke. These effects would be of short duration and low intensity. Since only limited acres are to be treated each year, not all of a species habitat will be treated at one time and suitable displacement habitat will be available for the short-term disturbance that may occur from the presence of smoke.

Upland bird species may be directly affected by fuel reduction activities particularly when crews, equipment, fire or smoke disturb nesting birds or young incapable of dispersal. Treatment during the breeding season (generally April through August) may result in the destruction of nests or nest abandonment. While many bird species have multiple clutches per year, treatment activities during any part of the breeding season may result in lowered reproductive success.

The Proposed Action Alternative may indirectly affect upland bird species when treatment activities result in the loss or modification of nesting, roosting, or foraging habitat. The habitat for ground nesting birds and mid-story nesting birds is more likely to be initially affected by prescribed burning activities. Long-term results of treatment will be to open up the understory and allow for an increase in grass and shrub species ultimately benefiting these species. Because small trees, less than 9 inches diameter at breast height (dbh), will be removed through mechanical means, tree and canopy nesting birds will experience some loss of habitat. However, some canopy and most cavity nesting birds occur in trees greater than 12 inches dbh and since trees greater than 9 inches dbh are to be retained, this impact will be reduced. The habitat for canopy and cavity nesting birds is not likely to be affected by prescribed burning since burns will be conducted under cool conditions and will unlikely result in mortality of trees greater than 9 inches dbh.

Long-term impacts from the action alternatives will mostly be beneficial, as fire risk reduction activities can improve foraging conditions for birds by reducing litter and creating small openings thus allowing for an increase in the amount of seeds, food plants, and insects. In general, bird population densities increased significantly in ponderosa pine stands after minor treatment consisting of thinning trees less than 9 inches dbh. Forest bird species that have experienced a decline due to increasing stocking levels, which contributes to decreases in grass seed, understory production, and flowers, include the broad-tailed hummingbird, American robin, and chipping sparrow (Brawn and Balda). Treatment as described under the action alternative would benefit these species. Conversely, species that have benefited from increases in dense thickets include western flycatcher, Townsend's solitaire, hermit thrush, and plumbeous vireo (Brawn and Balda). These species are unlikely to benefit from thinning activities. Despite the potential for short-term impacts to upland bird species from the action alternatives, no treatment will increase the likelihood of catastrophic wildfire that would likely result in the loss of large tracts of species habitat.

Environmental Consequences -- Mammals: Generally fire risk reduction activities can directly affect mammal species when crews, machinery, fire and smoke cause aural and visual disturbance to wildlife species that may be present in the treatment area. Most mammal species are mobile and are capable of dispersing from a fire or are capable of seeking refuge from fires in rocky areas or in burrows. For mammals not capable of dispersal or hiding, fire can cause burns, heat stress, carbon monoxide poisoning, and psychological stress.

Fire can indirectly benefit some opportunistic mammals such as foxes and raccoons that feed on dead insects in exposed small mammals in burned areas immediately after fire. Fire risk

reduction activities can indirectly affect small mammals by minimizing hiding cover thus increasing the potential for loss of nest sites and for predation. In addition fire can result in a short-term loss of grasses, forbs, and shrubs upon which many herbivorous mammals feed. Smoke can repel insects, which are the sole food source for bats. Because the areas in which prescribed fire will be conducted are limited in size, the loss of forage plants will be minimal when compared to available food sources adjacent to prescribed burn areas. The overall result of mechanical fuel reduction and prescribed fire on small mammal food sources is to improve conditions for forage species.

Most mammal species will experience an overall benefit from the action alternatives. Reducing fuel loads in the canyon will thin the canopy, open up the understory, increase the potential for grass and forbs production, rejuvenate strips of decadent chaparral, and reduce the threat of catastrophic wildfire that could result in severe impacts to large tract of habitat.

Cumulative Effects: Riparian species - Activities, other than those proposed for fuel reduction, occurring in riparian areas within Oak Creek Canyon include: day use and camping recreational activities in developed sites, dispersed areas, and on private lands; use of toxicants such as herbicides and insecticides, maintenance of utility lines; road maintenance; smoke from campfires and fireplaces, and water diversion. All these activities can affect wildlife and plant habitat through the loss, destruction, or modification of riparian vegetation. More specifically, activities within the riparian area results in: loss of soil-stabilizing ground cover; soil compaction; decreased amount of grasses, forbs, shrubs, and recruitment trees; increased potential for invasion of exotic weeds; decreased infiltration of water during rain events; increase rates of run off; increased sedimentation into streams; increase of contaminants into streams; and decreased water quality. Trails, roads, and recreation sites within the riparian corridor fragments habitat, disrupts wildlife movement, and reduces the amount of unaltered habitat. All of these activities impact riparian conditions, which consequently degrade wildlife and plant habitat.

Activities within the riparian zone may result in aural and visual disturbance to wildlife species, particularly during critical periods such as breeding, roosting, and feeding. Disturbance can result in increased physiological stress, nest, roost, or site abandonment, flushing of birds from eggs, premature fledging of young from nests, and reduction in the amount of suitable nesting and foraging areas. Some activities such as tree falling from road and utility line maintenance, vehicular use along 89A, and treatment of bark beetle infestations can result in the direct mortality of wildlife species. Tree falling during certain periods can result in mortality to bats roosting in cavities and under loose bark and unfledged birds in nests located among tree limbs or in tree cavities. Animal/vehicle collisions frequently result in the death of wildlife species.

Activities occurring in the uplands can also have an indirect effect on riparian habitat when degraded upland conditions contribute to increased water runoff, increased soil deposition, decreased water quality, and eventually exacerbated flood conditions.

Cumulative Effects: Upland Species - In addition to fuel reduction actions, there are many other activities that occur in the uplands of Oak Creek Canyon that contribute to cumulative effects to species and their habitat. Other activities include: day use and camping recreational activities in developed sites, dispersed areas, and on private lands; vehicular use; maintenance of utility lines; road maintenance; rock climbing; maintenance of orchards; bark beetle infestations and the treatment of infested stands; smoke from campfires and fireplaces; and other fuel reduction activities in upper portions of the watershed. All these activities can visually and aurally affect wildlife species as well as cause destruction or modification to wildlife and plant habitat.

The presence of people, pets, and equipment in Oak Creek Canyon can result in aural and visual disturbance to wildlife species, particularly during critical periods such as breeding, roosting, and feeding. Disturbance that occurs frequently and over a period of time can result in increased physiological stress, nest, roost, or site abandonment, flushing of birds from eggs, premature fledging of young from nests, and reduction in the amount of suitable nesting and foraging areas. Some activities such as tree falling from road and utility line maintenance, vehicular use along 89A, and treatment of bark beetle infestations can result in the direct mortality of wildlife species. Tree falling during certain periods can result in mortality to bats roosting in cavities and under loose bark and unfledged birds in nests located among tree limbs or in tree cavities. Animal/vehicle collisions frequently result in the death of wildlife species.

In addition to direct disturbance to wildlife species, day use and camping recreational activities can affect wildlife habitat when recreational activities reduce the amount of soil-stabilizing ground cover, compact soil, reduce the amount of grasses, forbs, shrubs, and recruitment trees; increase the potential for invasion of exotic weeds; all of which contributes to decreased infiltration of water during rain events and increase rates of water and soil run off. Because of the canyon's topography and the phenomenon of inversion, smoke from campfires, fireplaces, and other prescribed burning activities in the watershed can linger in the canyon. It is possible that too much smoke can drive away aerial insects upon which bats and birds feed. The use of trails (both system and social) and roads in the canyon can fragment wildlife habitat and disrupt wildlife movement within the canyon. Trails are often used by wildlife as travel corridors but use of the trails by humans can deter this.

The cumulative decreased in the quality and quantity of wildlife habitat from all activities in the canyon can cause site abandonment ultimately reducing the composition and diversity of wildlife species.

Research Natural Areas

Research Natural Areas exist in Oak Creek Canyon however, no treatment is prescribed in these areas under the proposed action alternative.

Chapter 4 - Consultation and Coordination

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

A Forest Interdisciplinary Team consisting of a hydrologist, wildlife biologist, recreation specialist, archeologist, landscape architect, fuels specialist and team leader reviewed the comments and conducted a review of the proposed project. The review concluded that the project is a minor use of National Forest system lands and the proposed action would not have significant effects on the quality of the human environment.

Scott Spleiss, Team Leader/Fuels and Fire

Judy Adams, NEPA Coordinator and Recreation

Janie Agyagos, Wildlife Biologist

Dirk Renner, Fisheries Biologist

Jack Norman, Soils/Air/Watershed

Jennifer Burns, Landscape Architect

Sharynn Blood, Archeologist

William Stafford, Recreation

FEDERAL, STATE, AND LOCAL AGENCIES:

Sedona Fire District

Arizona Department of Environmental Quality

US Fish and Wildlife Service

OTHERS:

Oak Creek Canyon Landowners

Pine Flat Homeowners Association

Mission Rancho/Rancho Shangri-La Association

AGENCIES, TRIBES, ORGANIZATIONS AND PERSONS CONSULTED

Dine' Medicine Man's Association, Fort McDowell Yavapai Nation, Hopi Tribe, Hualapai Tribe, Havasupai Tribe, Navajo Nation, Pueblo of Zuni, San Carlos Apache Tribe, San Juan Southern Paiute Tribe, Tonto Apache Tribe, Yavapai-Apache Nation, Yavapai-Prescott Tribe, and White Mountain Apache Tribe.

Appendix A

Mitigation Measures

Air Quality Protection: All burning will be closely coordinated with Arizona Department of Environmental Quality. No burning will occur without their approval, nor will a burn continue if smoke conditions appear to be severely hampering air quality. Smoke dispersal will be closely monitored at all times, and meteorological forecasts will be obtained on a daily basis, at a minimum. Burning will occur during timeframes that will allow the smoke to rise out of the Canyon whenever possible.

Soil/Water Protection: No burning will occur within 150 feet of Oak Creek, or any of its main tributaries. On any slopes greater than 40%, all burning will be horizontal, contouring the lay of the land. These burns will not be greater than 300 feet in width, or longer than ¼ mile. No burning within 50 feet of secondary drainages.

Reduce Erosion and Sedimentation: Large islands of unburned vegetation will always be present—no more that 250 acres of land to be burned annually. Treatment of an area adjacent to a previously treated site will not occur until sufficient regrowth has occurred on that treated area.

Accidental Spills: Implement measures and plans to prevent the contamination of soil and water from accidental spills of petroleum products and hazardous substances.

Heritage Site Discovery: Suspend work if a heritage site is discovered during project implementation. Authorize resumption of work only after consultation with the State Historic Preservation Office (SHPO) is complete. Any area with mechanical work will be surveyed and approved by SHPO before a project begins. Additional clearance conditions are attached to the archeological clearance document related to existing eligible cultural resource sites. Coordination with the Forest or District Archeologist and appropriate monitoring and mitigation must be done while planning annual treatments.

Impacts to Recreational Users: Areas adjacent to campgrounds will be treated in a manner so that any impacts to users are minimized as much as possible. Safety to the Forest users will be of utmost importance, and Security and Public Information personnel will be utilized whenever needed.

Scenery Mitigation Measures:

- Stumps should be cut flush with the ground within 30 feet of the use area. Cut faces should point away from the viewer within 30 feet. Stumps beyond 30 feet should be no higher than 4” on the high side. Along the highway stumps should be cut with the cut facing away from the road and no higher than 4” within 30’ of fog stripe.
- Burn piles should be located away from sensitive view points and burned within one year in locations close to sensitive viewers along trails, near residences, campgrounds and picnic areas.
- Fire line or other visible fire preparation actions, etc. should not be visible from trails or recreation sites (or should be rehabilitated within 6 months of treatment).

- All treatment areas will have irregular edges to reduce the effects on scenic values.

Wildlife Mitigation Measures (Biological Opinion):

The following mitigation measures are mandatory as per the April 2001 Regional Batched-Programmatic Wildland Urban Interface Biological Assessment and Opinion.

Area-Wide

- Best Management Practices will be followed in all treatment areas (Forest Service Handbook FSH 2509.22 entitled Soil and Water Conservation Practices Handbook 12/3/90 ver).
- Allow no permanent or temporary road construction.
- All skid trails and ORV trails resulting from the proposed action will be obliterated and restored.
- Within WUIs, mechanical treatments will occur in stands with high fuel loads in order to minimize high intensity fires that may occur from either prescribed burns or wildfires. Once these areas have been mechanically treated, prescribed burning may be used to further reduce fuel levels. Before prescribed burning can occur, a burn plan must be developed. This burn plan will be designed to minimize high intensity fires and the possibility of escape.
- Biologists and silviculturists will be involved in the development of prescribed burn plans and thinning plans to minimize downstream effects to TE&P species and their habitats. Activities to consider include: implementing projects in phases; burning in a time of year to allow vegetative growth prior to summer rains; protecting key riparian areas; minimize fire or thinning in riparian areas; installation and maintenance of sediment structures; and monitoring.
- There will be no creek crossings in perennial systems except where established road crossings exist or where dry, intermittent sections occur.
- There will be no vehicles or heavy equipment (including tracked vehicles) use in riparian areas, except for when crossing riparian areas at established crossings.
- There will be no pile or jackpot burning in ephemeral, intermittent, or perennial channels.
- When prescriptions require modification of forested areas, a certified silviculturist must be involved in the design of treatment plan and must approve the final plan.
- Large, downed woody materials (12" diameter or greater) and snags will be retained in riparian areas.
- For WUI areas with TE&P species or designated critical habitat downstream, Forest Service biologists and watershed specialists (hydrologist, soil scientists) in coordination with USFWS will determine:

- The number of acres and the number of projects or phases of projects to occur within one watershed per year.
 - An appropriately-sized buffer adjacent to perennial streams in order to minimize soil and ash from entering the stream.
 - Where livestock grazing occurs in areas that have been burned, specialists will determine when grazing can be resumed. Such deferments from grazing will only occur when necessary to protect streams from increased ash or sediment flow into streams.
- If agreement can not be reached or treatment will not meet fuel reduction objectives, the Forest Service will re-initiate consultation.
 - Fire will not be used as a tool in riparian areas within or in close proximity to TE&P species or their habitat or in areas where there is a potential to impact downstream TE&P species habitat. Broadcast burning in riparian areas (where there are no concerns with TE&P species or habitat in close proximity or downstream of project area) is allowed where low intensity fires can be maintained.
 - Native species of seed will be used where re-seeding of grasses and herbaceous vegetation occurs after ground disturbing activities.

Mexican Spotted Owl:

Within ½ mile of private lands as delineated on maps supporting this assessment, intensive treatment may occur in Mexican spotted owl habitat as described in Sections III, A and III, B above with the following measures:

- Prior to intensive treatment within the ½ mile buffers, establish 100-acre activity centers within known PACs. Avoid or minimize impacts to the greatest extent possible.
- Monitor and report the number of activity centers impacted, the number of acres treated, and the type and intensity of treatment that occurred within each activity center.

Outside of the ½ mile buffer within PACs, protected habitat, and restricted habitat, treatments will be designed to be consistent with the MSO recovery plan and Forest Land Management Plans.

In PACs:

1. Establish PACs at all spotted owl sites known from 1989.
2. No harvest of trees >9 inches dbh is allowed in PACs. Harvest of any trees is only permitted as it pertains to 5 below.
3. Fuelwood harvest within PACs should be managed in such a way as to minimize effects to the owl and its prey, and their habitat.

4. Continue to work with the USFWS and the recovery team to develop a monitoring program that assesses the combined effects of thinning and fire on spotted owls and their habitat.
 - a. Ideally, a paired sample of PACs should be selected to serve as control areas.
 - b. Within each selected PAC, designate 100 acres centered around the nest site. This nest area should include habitat that resembles the structural and floristic characteristics of the nest site. The 100 acres will be deferred from the treatments described below.
 - c. Within the remaining 500 acres, combinations of thinning trees < 9 inches dbh, treatment of fuels, and prescribed fire can be used to reduce fire hazard and improve habitat conditions for owl prey. Habitat components that should be retained or enhanced include large logs (>12 inches midpoint diameter), grasses and forbs, and shrubs. Emphasis of the spatial configuration of treatments should be to mimic natural mosaic patterns when consistent with fire risk reduction objectives.
 - d. To the greatest extent possible, treatments should only occur during the non-breeding season (1 September to 28 February) to minimize any potential deleterious effects on the owl during the breeding season.
 - e. Following treatments to the PACs, effects on the owl, prey species, and their habitats should be assessed. If such effects are non-negative, an additional sample of PACs may be treated. If negative effects are detected, these effects must be carefully evaluated. If they can be ameliorated by modifying treatments, those modifications should occur prior to treatment of additional PACs. If not, reinitiate consultation with the USFWS.
5. Within PACs treated to reduce fire risk, pre-and post-treatment assessments of habitat conditions and owl occupancy should be done. Specific habitat characteristics that should be monitored include fuel levels, canopy cover, snag basal area, volume of large logs (12 inch midpoint diameter), and live tree basal area.
6. No aerial ignition within PACs

In areas with Steep Slopes (outside of PACs):

7. Within mixed-conifer and pine-oak types, allow no harvest of trees >22.4 cm (9 inches) on any slopes >40% where timber harvest has not occurred in the past 20 years. These guidelines also apply to the bottoms of steep canyons. Thinning of trees <9 inches dbh, treatment of fuels, and fire are allowed, as discussed in 4c above. No seasonal restrictions apply. Prescribed natural fire and the creation of fire breaks may be used as appropriate. On steep slopes treated to reduce fire risk, either by the use of prescribed fire alone or in conjunction with removal of stems and ground fuels, pre- and post-treatment monitoring of habitat conditions

should be done. Specific habitat characteristics to be measured include fuel levels, snag basal area, volume of large logs (>12" midpoint diameter), and live tree basal area.

8. Reserved Lands: Encourage the use of prescribed natural fire where appropriate in Wilderness, Research Natural Areas, and other reserved lands.

Restricted Areas: These measures should be followed whenever consistent with risk reduction objectives.

1. Manage mixed-conifer and pine-oak forest types to provide continuous replacement nest habitat over space and time (Table III.B.1 of spotted owl recovery plan).
2. Incorporate natural variation, such as irregular tree spacing and various stand/patch sizes, into management prescriptions and attempt to mimic natural disturbance patterns.
3. Maintain all species of native vegetation in the landscape, including early seral species. To allow for variation in existing stand structures and provide species diversity, both uneven-aged and even-aged systems may be used as appropriate.
4. Allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure.
5. Within pine-oak types, emphasis should be placed on management that retains existing large oaks and promotes the growth of additional large oaks.
6. Retain all trees >61 cm [24 in] dbh.
7. Retain hardwoods, large down logs, large trees, and snags.
8. Emphasize a mix of size and age classes of trees. The mix should include large mature trees, vertical diversity, and other structural and floristic characteristics that typify natural riparian conditions.

Other Forest and Woodland Types: No specific guidelines are offered for other forest and woodland community types where they occur outside PACs.

Fish

- Thinning and any other type of mechanical treatment of vegetation in drainage bottoms that flow into TE&P fish habitat will be coordinated with the District Biologist and a Fisheries Biologist.

Recommended Measures to Minimize Effects to TEP Species and Habitat

In addition to the mandatory measures described above, the following measures should be implemented to further minimize effects to listed species.

Area-Wide

- All personnel on the fire should be informed and educated about listed species and the importance of protecting habitat and minimizing take.
- Resource Advisors should be designated to coordinate sensitive species and other resource concerns. Monitors should be designated to monitor fire activities; to ensure protective measures endorsed by the Project Manager are implemented; and to perform other duties necessary to ensure adverse effects to listed species and their habitat are minimized. Monitors and Resource Advisors serve as a resource for the Project Manager, but do not get involved in specific fire tactics. All direction and orders to fire crews must come through the chain of command. Safety of fire crews is paramount and the Project Manager is afforded maximum flexibility to ensure that the fire is carried out as effectively and safely as possible.
- Off-road vehicle activity should be kept to a minimum. Vehicles will be parked as close to roads as possible, and vehicles should use wide spots in roads to turn around.
- Equipment staging areas should be located outside of the habitats of listed species, preferably in locations that are previously disturbed. If staging areas must be placed in sensitive areas, surveys should be conducted and measures taken to minimize the area disturbed by such activities and reduce effects to species and habitats.
- The Forests should, to the extent possible, obliterate vehicle tracks made during the fire, especially those of tracked vehicles.
- Recovery of vegetation should be monitored, including establishment and monitoring of paired plots, inside and outside of the burned area.
- The effectiveness of minimization measures for sensitive species should be evaluated after a fire. Procedures should be revised as needed.
- An objective of fire management projects should include protection of listed species and their habitats.
- Retain as many snags > 9" dbh as possible.

Mexican Spotted Owl

When possible to meet fire risk reduction objectives, treat the area within the ½ mile buffer using the spotted owl mandatory minimization measures for areas beyond the ½ mile buffer.