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Environmental Assessment

Victorine Wildland Urban Interface Project

Mogollon Rim Ranger District, Coconino National Forest
Coconino County, Arizona

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CHAPTER 1: PURPOSE AND NEED

Proposed Action

The Coconino National Forest is proposing fuels management treatments on about 7,500 acres of National Forest System Land to reduce fuel loading in the Victorine WUI. The Victorine WUI project proposes combinations of thinning and prescribed burning activities to reduce wildfire risk to people and property within the Victorine project area. The Victorine WUI project would also provide further protection to portions of the Blue Ridge WUI north of the project area. The Victorine WUI project is proposed at this time to respond to goals and objectives of the National Fire Plan (USDA Forest Service 2000a) and the Coconino National Forest Land and Resource Management Plan (USDA Forest Service 1987).

The proposed action includes the following treatments:

- Maintenance Thin/Burn on 890 previously treated acres
- Maintenance Burn on 911 previously treated acres
- Burn/Thin/Burn on 782 previously untreated acres
- Burn on 4,915 previously untreated acres
- Thin and Chip Slash on 10 previously untreated acres

The Proposed Action, Alternative B is described in detail in Chapter 2.

Victorine is in the southeast corner of the Coconino National Forest (Figure 1-1) and in the east central portion of the Mogollon Rim Ranger District. The Victorine project area encompasses 19,915 acres in the East Clear Creek Ecosystem, and includes 17,718 acres of Coconino National Forest land and 2,197 acres of private land. The legal location is within Townships 13 and 14 North, and Ranges 12 and 13 East (Figure 1-2). East Clear Creek is the northern boundary, Leonard Canyon the eastern boundary, Yeager Canyon is the western boundary, and Forest Road 298 to Dines Tank is the southern boundary.

Purpose of and Need for Action

The purpose of this project is to reduce crown fire hazard in the Victorine WUI. There is a need to apply management activities that move the existing conditions in the direction of the desired conditions by reducing live and dead fuel loading in the Victorine WUI.

Existing Condition

Stand-replacing crown fires threaten people, private property, and habitat for threatened and sensitive species

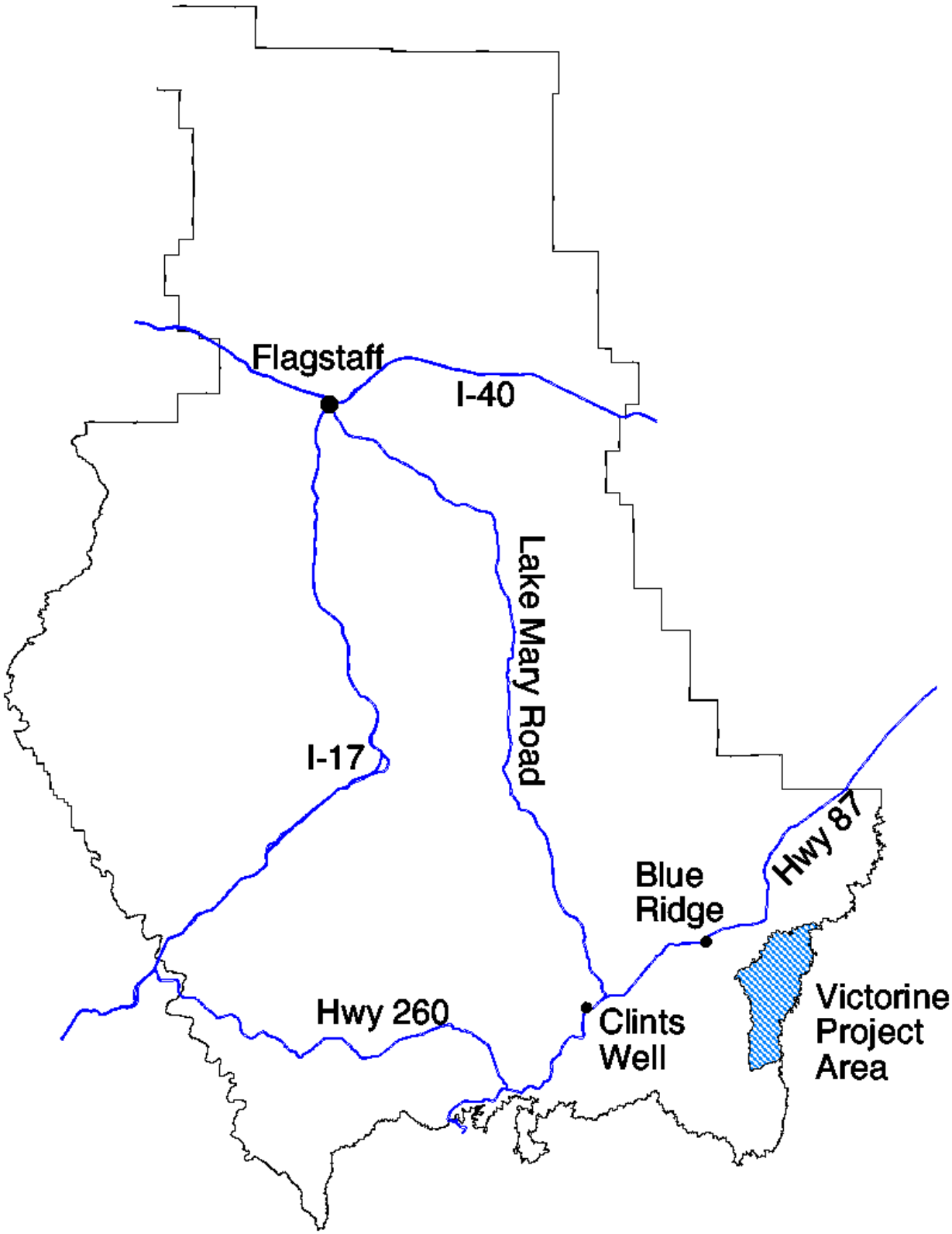


Figure 1-1: Victorine Wildland Urban Interface Project Vicinity Map

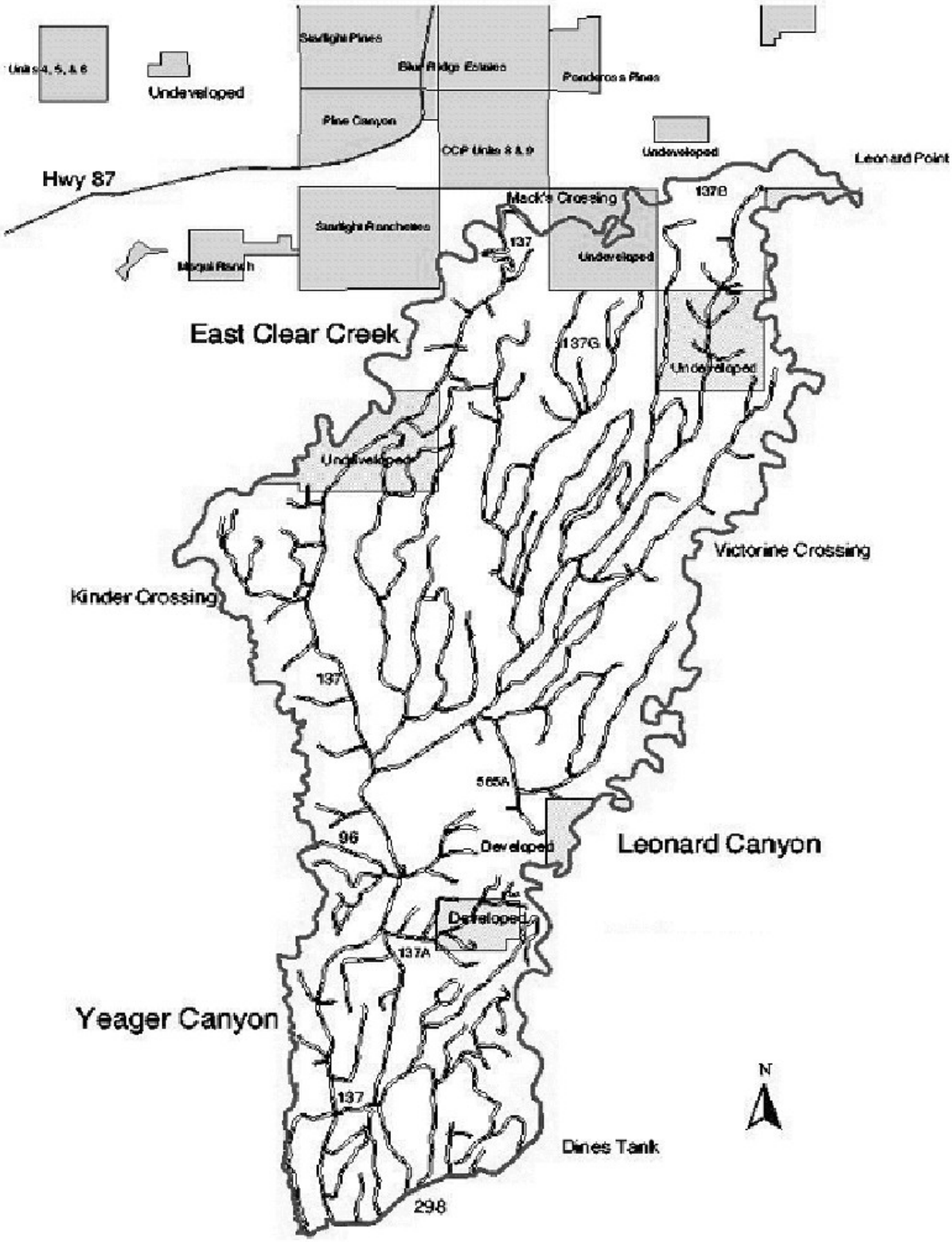


Figure 1-2: Victorine Wildland Urban Interface Project Area

The Victorine WUI area lies adjacent to and southeast of the Blue Ridge Urban Interface area. The Blue Ridge WUI contains over 1,000 homes (Figure 1-2). There are approximately 10 homes within the 2,156 acres of private land in the Victorine project area. Area residents, as well as forest users, come to the area for recreation, hunting, and fuel-wood gathering. People and private property in the Victorine area are at risk to crown fire originating on Forest Service lands due to dead and down fuel accumulations and dense forest conditions with low ground to live crown base heights.

The Victorine project area hosts all or part of twelve protected activity centers of the Mexican spotted owl, (MSO), *Strix occidentalis lucida*, and two nest sites and post fledging areas of the northern goshawk, *Accipiter gentilis*,. Critical habitat for the Little Colorado spinedace, *Lepidomeda vittata*, a threatened fish species, exists in East Clear Creek on the northern boundary of the project area. These Federally threatened and Forest Service sensitive species and their habitats are also subject to the increasing risk of stand replacing crown fires.

Low ground to live crown base heights, and high stand density increases fire risk

Ground to live crown base heights are commonly less than 10 feet and canopy cover exceeds 40 percent on over half of the project area. Over a century of fire exclusion has allowed the growth of dense thickets of small diameter trees underneath stands of large trees and into open areas.

The accumulation of surface and ladder fuels has increased the risk for large stand-replacing crown fires. In addition, high stand densities (also indicated by canopy cover) decrease tree growth and vigor across all diameter classes and tree species. These factors inhibit resistance to pathogens such as insects and drought at the single-tree, stand, and forest levels, which can further increase the potential future crown fire hazard. Lightning fires, increasing recreation use, and a growing local population contribute to fire risk by providing ample ignition sources.

Large volumes of dead fuel loading increases fire risk

Over a century of fire exclusion has increased the accumulation of downed-woody fuels. Surface fuel loading currently averages over 10 tons per acre across the project area and is almost wholly comprised of pine litter and woody debris. Fuel loads on the northern half of the project area average over 13 tons per acre while the southern half averages just over 10 tons per acre.

Desired Conditions

The following are the desired conditions in the project area:

- The threat of stand-replacing crown fires to people, private property, developments, and habitats for sensitive and threatened species are reduced to manageable levels.

- Future crown fires are confined to isolated pockets as occurred during pre-European settlement times because of high ground to live crown base heights, low stand densities, and low dead and down fuel loading;
- Ground to live crown base heights of ponderosa pine stands average 10 feet or greater and average stand densities range from 40 – 80 square feet of basal area.
- Dead fuel loading ranges from 1-30 tons per acre but would average less than 10 tons per acre on sites dominated by ponderosa pine and average less than 5 tons per acre in openings with grasses and forbs.

Objectives and Unit of Measure

Objective: Reduce crown fire hazard in the Victorine WUI through thinning and prescribed burning.

The measures of the objective are as follows:

- Change in surface fuels (tons/acre)
- Change in stand density (trees/acre)
- Change in crown base height (ft)

The ultimate targets for the three measures may not be met immediately following proposed treatments due to limitations relative to the existing vegetation conditions and other constraints. Values of the units of measure that trend from undesirable existing conditions towards desired future conditions are considered an improvement in overall condition. The target values for the units of measure are provided above under the Desired Conditions section.

Background

In 2000, in response to a request by President Clinton, the Secretaries of Agriculture and the Interior developed an interagency approach called the National Fire Plan[1] (NFP) to respond to severe wildland fires and reduce their impacts on rural communities, and assure sufficient firefighting capacity in the future. The NFP 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 NFP. It addresses the need to manage overly dense forest vegetation that is the result of decades of fire exclusion from those lands. Fuel management activities incorporate all types of treatments necessary to change stand condition classes[2] (which reflect the level of

[1] http://www.fireplan.gov/overview/whatis.html

[2] Condition Class 1:
Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within the historical range.
Condition Class 2:
Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.
Condition Class 3:

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 interface[3] (WUI) areas to reduce risk to people and property. The Cohesive Strategy[4] states, the first priority for fuels reduction "will be the millions of acres already roaded and managed landscapes that are in close proximity to communities." The Cohesive Strategy sets four priorities: WUIs, readily accessible municipal watersheds, threatened and endangered species habitat, and maintenance of existing low risk Condition Class 1 areas which are previously treated areas or areas in which the ecosystem is still functioning within its historic range of variability.

In May of 2002, the Springer fire on the Mogollon Rim Ranger District of the Coconino National Forest, exemplified the effectiveness of NFP fuels treatment implementation[5]. The fire occurred approximately six miles west-northwest of the Victorine WUI project area. A crown fire run occurred, jumping Forest Service roads and State Highway 87 threatening two developed subdivisions within the Blue Ridge WUI. When the wildfire entered the forest where a prescribed burn was conducted in February of 2002, the fire changed behavior. The fire dropped from the forest canopy to the ground. This slowed the rate of fire spread, and provided a safer, more workable space for firefighters to contain the blaze and protect the Blue Ridge WUI.

Decision To Be Made

The District Ranger of the Mogollon Rim Ranger District, Coconino National Forest is the Deciding Official for this project. The decision to be made is whether to approve the Proposed Action, another alternative, or develop an alternative design that meets the purpose and need and moves the area towards the desired condition, or to not implement a project at this time.

Forest Plan Consistency

This action responds to the goals and objectives outlined in the Coconino National Forest Land and Resource Management Plan (Forest Plan), as amended, and helps move the project area towards desired conditions described in that plan (Coconino National Forest Plan 1987). The Forest Plan provides two types of management direction, Forestwide direction and Management Area direction. The first Forestwide goal for Protection on

Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.

[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.fs.fed.us/publications/2000/cohesive_strategy10132000.pdf

[5] http://www.fireplan.gov/reports/69-77-en.pdf

page 25 of the Forest Plan applies to this proposal: "Use fire as resource management tool where it can effectively accomplish resource management objectives." The proposal is consistent with two key Forestwide standards and guidelines under the program component of "Protection" and activity, Fuel Treatment. These are described below in Table 1-1.

Table 1-1: Applicable Forestwide Standards and Guidelines Under Program Component Protection

Fuel Treatment	Standards and Guidelines	Pages in Forest Plan
P11	Plan fuel treatments on an area basis. Fuel treatment objectives are met on the area as whole and not necessarily on each acre. Plan fuel treatments that have the least impact on the site, meet resource management needs, are cost effective, and meet fuel treatment objectives.	p. 95
P12	Limit the treatment of natural fuels to areas where fuel buildups are a threat to life, property, adjacent to old growth areas, or specifically identified high resource values.	p. 95

This proposal lies within a number of Management Areas (MAs). Table 1-2 outlines the Forest Plan Management Areas within the project area and the respective management emphasis for each as outlined in the Forest Plan. Figure 1-3 displays the location of these management areas.

Table 1-2: Management Areas within the Victorine Project Area

Management Area	Acres	Forest Plan Emphasis	Pages in Forest Plan
MA-3: Pine or mixed conifer forest less than 40% slope	14,571	Emphasize a combination of multiple-uses including a sustained-yield of timber and firewood production, wildlife habitat, livestock grazing, high quality water, and dispersed recreation.	Amend. 11, p. 117
MA-4: Pine or mixed conifer forest greater than 40% slope	2,423	Emphasize wildlife habitat, watershed condition, and dispersed recreation. Management intensity is low.	Amend. 17, p. 139
MA-6: Unproductive timber land. Includes juniper-pine transition	214	Emphasize a combination of wildlife habitat, watershed condition, and livestock grazing. Other resources are managed in harmony with the emphasized resources.	Amend. 17, p. 145
MA-7: Pinyon-juniper woodlands less than 40% slope	262	Emphasize firewood production, watershed condition, wildlife habitat, and livestock grazing. Other resources are managed in harmony with the emphasized resources.	Amend. 17, p. 148
MA-8: Pinyon Juniper greater than 40% slope	112	Emphasize wildlife habitat, watershed condition, and dispersed recreation. Management intensity is low.	Amend. 17, p. 156
MA-9: Mountain Grasslands	12	Emphasize livestock grazing, visual quality, and wildlife habitat. Other resources are managed in harmony with emphasized resources. The smaller mountain meadows in remote areas are managed mostly for wildlife habitat, especially for elk summer range.	Amend. 17, p. 158
MA-12: Riparian and Open Water	124	Emphasize wildlife habitat, visual quality, fish habitat, and watershed condition on the wetlands, riparian forest, and riparian scrub. Emphasize dispersed recreation, including wildlife and fish recreation, on the open water portion.	Amend. 17, p. 172
PRIVATE	2,197	Not Applicable	

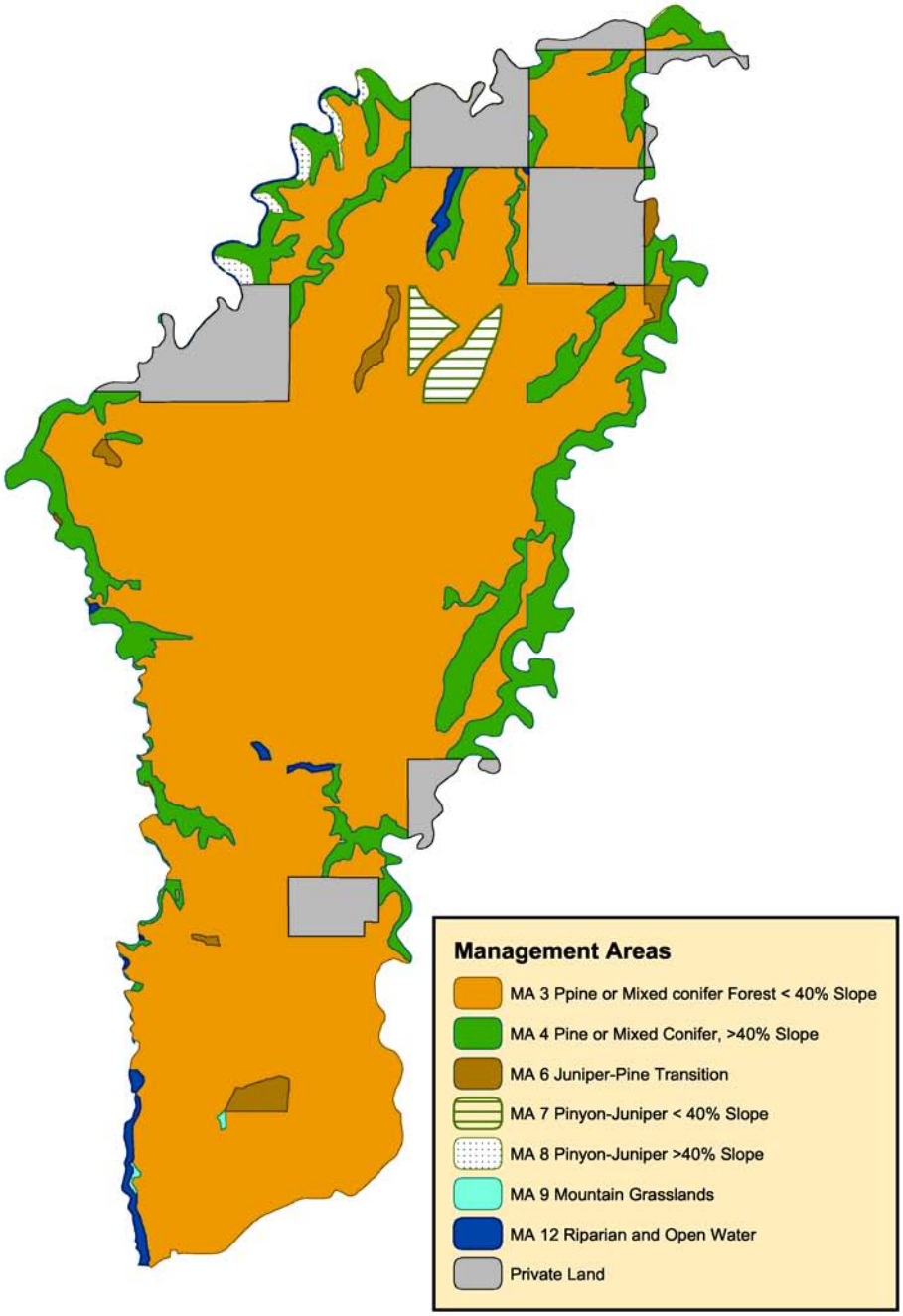


Figure 1-3. Management Area (MA) Map for the Victorine Wildland Urban Interface Project Area

Approximately 14,571 of the 19,915 acres within the Victorine project area (73%) are in Management Area 3. Nearly all of the proposed treatment acres in Alternatives B and C are in Management Area 3. The Forest Plan emphasizes sustained yield of timber and fire wood production, wildlife habitat, water quality, and dispersed recreation for this management area.

Applicable Laws and Executive Orders

Shown below is a 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 of 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
Executive Order 11593 (cultural resources)
Executive Order 12898 (environmental justice)
Executive Order 12962 (aquatic systems and recreational fisheries)
Executive Order 13186 Jan. 11, 2001 (Migratory Bird Treaty Act)
Arizona, Department of Environmental Quality, Air Quality Division: Wildland Prescribed Fire Permits

Public Involvement

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). 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.

The Victorine project has been listed on the Coconino National Forest Schedule of Proposed Actions since January of 2000. On September 19, 2000, a scoping letter providing project information and seeking public comment was mailed to approximately 500 individuals and groups (PR# P11-13). This included federal and state agencies,

federally recognized American Indian Tribes, municipal offices, businesses, interest groups, and individuals. A total of 63 responses to the initial mailing were received (PR# P15-49, P54-64, P67-80, P82-84). The public responses identified issues, expressed opinions or voiced concerns about various aspects of the project. The public comments to scoping are listed in Appendix A. The responses are summarized into the following general categories. Some of the responses fit into more than one category.

- **Informational:** 23 respondents made no specific comments but requested additional information or wanted to remain on the mailing list. 1 individual requested to be taken off the list.
- **Positive Comments:** 14 respondents expressed general support of the proposed action. Another 6 respondents supported thinning of small diameter fuels and prescribed burning.
- **Negative Comments:** 6 respondents expressed disagreement with all or parts of the proposed action based on opinions regarding the overall fire hazard of the area, use of prescribed fire to reduce fuels, dislike of past thinning in the area, concerns of fire escape, dislike of smoke associated with prescribed fire, and general distrust of Forest Service management activities.
- **Out of Scope:** 4 respondents provided comments that did not relate to the proposed action.
- **Concerns:** 8 respondents presented specific concerns about the project relating to issues of air quality, visual quality, socio-economic impacts, and snags and down wood. Another 10 respondents were very concerned about prescribed fire control, fire escape, potential property loss, and forest closures during prescribed fire; 5 responses requested prior notification of prescribed fire and thinning activities.

Announcements about the project were printed in the High Country Informant in 2003 and 2005 (PR# P86, P93-94). Representatives from the Arizona Game and Fish Department and the Blue Ridge Fire Department participated in interdisciplinary team meetings and site visits.

Analysis of the public scoping comments resulted in the development of Alternative C along with some of project specific resource protection measures described in Chapter 2 of the EA. Alternative C addresses public concerns with prescribed fire control by proposing more acres of thinning, piling and burning adjacent to developed private land rather than prescribed or broadcast burning of thinning slash. Piling and burning slash in sensitive wildlife areas would also reduce the potential loss of snags and down logs compared to broadcast burning. Additional acres of prescribed burning and maintenance burning treatments are proposed in Alternative C to address concerns of inadequate protection to private property over the long term.

The Environmental Assessment was completed in July 2005 and a letter dated July 26, 2005, requesting public comments on the EA, was mailed to individuals that have shown interest in the project (PR# P90-91). Information was mailed out to 67 individuals, agencies and other groups. The Proposed Action and Alternatives were summarized in attachment to the letter requesting public comment. A legal notice requesting formal

comments was published in the Arizona Daily Sun on July 27, 2005 (PR# P92, P103). The Victorine WUI Environmental Assessment and the letter requesting public comments were posted on the Coconino National Forest web site on July 27, 2005 (http://www.fs.fed.us/r3/coconino/nepa/index.shtml#July27.

Public comments on the EA were received from 8 individuals (PR# P95-102). The public comments and our responses to the comments are described in detail in Appendix D of the EA. The project Alternative C was supported by all eight respondents. Specific concerns about the project included a request for no thinning along major roads based on visual concerns with past thinning in the area, visual and fuels concerns with past burning of slash piles and the practice of leaving slash piles unburned, and lack of maintenance on roads in the area. Another respondent expressed concerns with the inherent risks of prescribed fire and requested that the most safe and prudent methods and procedures be used during burning. Another respondent inquired why there are no fuel reduction treatments proposed in the northern portion of the project area. Analysis of the public comments by the interdisciplinary team determined that none of the comments presented new issues or were significant enough to change the EA or to develop a new alternative. Resource protection measures and best management practices to protect soil, water quality, and road condition, maintain scenery values, protect public safety, and lessen the risk of escaped prescribed fires have been fully incorporated into the project design and are detailed in Chapter 2 of the EA.

The *Public Involvement Record* for the Victorine Wildland Urban Interface Project 2006 contains the scoping letters and letters requesting comments on the EA mailed out to the public, Tribal governments, state and federal agencies and any replies received by the Forest. It also includes documentation of other public involvement efforts such as legal notices and community newspaper articles. Also included are documents describing comments received from the public and the analysis and disposition of their comments (PR# P87, P105). This has been included in Appendix A of this EA.

Issues

Significant Issues

Issues are statements of problems to be solved or problems that may be created by the proposed action. Analysis of public and internal comments for the Victorine WUI project identified no significant issues. Additional internal scoping during the interdisciplinary team planning process identified a number of concerns that deserved consideration. These concerns and their related project design features and resource protection measures resulted in the generation of a modified proposed action or Alternative C. See the Comparison of Alternatives section in Chapter 2 for a description of how these concerns are addressed within Alternative C.

Non-significant Issues

The reasons issues are categorized as non-significant include: 1) they are outside the scope of the proposed action; 2) they are already decided by law, regulation, Forest Plan or other higher level decision; 3) they are irrelevant to the decision to be made; or 4) they are conjectural and not supported by scientific or factual evidence. The Council of Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.c)…" A list of non-significant issues and reasons regarding their categorization as non-significant may be found in Appendix A. Several of these non-significant issues are briefly presented here, as they are procedures required by law and regulation, or have been decided by the Forest Plan or other higher level decision. Each non-significant issue includes an issue statement, followed by a discussion of why it is non-significant for this proposal. All of the supporting documents listed below are incorporated by reference and on file in the project record.

Air Quality Issue: *Smoke from prescribed fires can impact visibility in Class I Wilderness, exceed air quality standards, impact adjacent areas in Non-Attainment status, and negatively impact human health.* Consistent with the Federal Clean Air Act, State regulations (Article 15, Forest and Range Management Burns, R18-2-15), and Forest Plan Standards and Guidelines, the project would incorporate smoke management and emission reduction techniques. Burning would only occur when permitted by the Arizona Department of Environmental Quality to minimize effects on human health and the environment. Smoke management and emission reduction techniques would be incorporated to: minimize effects to Class I Wilderness, and the Payson PM10 Maintenance area; meet National Ambient Air Quality Standards; and comply with law. Refer to Chapter 2 Resource Protection Measures for Alternatives. Delineating smoke sensitive areas is a requirement on Burn Plans, and notifying private landowners and local communities through the media, personal communication, or by signing is a standard operating procedure prior to conducting and during implementation of prescribed fire. The "*Fire, Fuels and Air Quality Report for Victorine WUI*" by Jerman dated October 19, 2004 provides the supporting analysis for these findings. This report identifies measures to minimize smoke impacts of the project, and describes the direct, indirect and cumulative effects of the alternatives on air quality.

Visual Quality Issue: *Fuel treatment activities such as thinning, piling and burning, and prescribed fire will alter the naturally appearing characters of the forested landscape.* This has been decided by land allocations in the Forest Plan. The project design incorporated Forest Plan Standards and Guidelines designed to meet Visual Quality Objectives of the project area. Resource protection measures have been designed into the project to minimize visual effects of forest thinning and prescribed fire. Temporary changes in visual quality would occur due to the presence of thinning slash, and piles and there would be crown scorch from prescribed fire. These changes would not be either severe enough or long term to change the Visual Quality Objectives of the area. The "*Recreation Specialist's Report, Victorine WUI*" by Jerman dated May 18, 2004 provides the supporting analysis for these findings. This report identifies measures to minimize

visual quality impacts of the project, and describes the direct, indirect and cumulative effects of the alternatives on visual quality.

Socio-economic Issue: *Project activities may cause adverse socio-economic effects and loss of ecosystem service values due to commercial logging.* The Forest Plan has decided the management direction and goals for the timber resource. The alternatives are consistent with the Forest Plan vegetative management practices. The action alternatives propose thinning of understory trees up to 12 inches in DBH to reduce fuels and crown fire hazard in the Victorine WUI. If the market for small diameter wood products improves, then there would be a small market benefit from thinning under the action alternatives. Fuel wood may be provided to the public from the understory thinning material. A market benefit from understory thinning (ladder fuels reduction) and prescribed burning (ground fuels reduction) would benefit the Victorine and the Blue Ridge WUI and developed private lands because fire risk would be reduced. The forest ecosystem would remain intact and would have an improved resiliency to wildfire. Because the Action Alternatives are consistent with the Forest Plan and would move towards the desired condition of the forest, their implementation would also contribute towards the maximization of net public benefit. Many non-market benefits of the proposed action alternatives would also be realized including: benefits to old growth dependent wildlife, a healthier ecosystem, and improved habitat for threatened, endangered and sensitive TES species. The "*Economic Analysis for the Victorine WUI*" by Koyiyumptewa, dated July 19, 2004 quantifies the economic costs and benefits of the alternatives analyzed.

Snag and Down Wood issue: *Project activities may cause a loss of snags and down wood from the forest ecosystem.* This was decided by the Forest Plan Standards and Guidelines, which were designed to provide adequate snags and large down wood for species habitat needs and soil productivity, without increasing fuel loading to an unacceptable level. Snags are generally lower than Forest Plan standards and guidelines in the project area. There would be some loss of snags from prescribed burning, (about 15-25% of large snags >16"DBH could be lost per acre treated) but new snags would be recruited as trees die from initial and maintenance burning. Snags in critical wildlife areas would be protected from fire effects by digging hand lines around existing snags. Over the long term, with application of prescribed fire, snags would be increased trending toward Forest Plan standards and guidelines. The project area currently contains on average 4 to 5 logs per acre, which is greater than the 3 or more recommended in the Forest Plan. Downed logs per acre would also be reduced by 30 to 50% from prescribed burning. Logs per acre would remain about 4 per acre on 12,400 acres and would decrease to 1-2 per acre on 7,000 acres. Project-wide, logs would remain at or above Forest Plan standards and guidelines. New downed logs would be recruited as tree boles die and fall down after prescribed burning. The "*Wildlife Specialist's Report for the Victorine WUI Project*" by Taylor, dated May 29, 2005 provides support for these conclusions, and describes the direct, indirect and cumulative effects of the alternatives on snags and downed wood. Protection measures to retain logs and snags on the landscape during thinning and prescribed burning are also described.

Project Record Availability

The planning record for the Victorine Wildland Urban Interface project includes all project-specific information, including records of public involvement, resource reports, IDT records, and results of field investigations. These documents are referenced throughout the EA by title and or project record number and key points are summarized. The planning record is located at the Mogollon Rim District Office located at the Blue Ridge Ranger Station in Happy Jack, Arizona. These records are available for public review.

CHAPTER 2: COMPARISON OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes alternative development, alternatives considered in detail, design features and resource protection measures, and compares the alternatives considered by the Forest Service for the Victorine WUI project.

Alternative Development

The Proposed Action was developed to meet the purpose and need for action. The Interdisciplinary Team designed the proposal to minimize effects on resources, which caused many issues to be categorized as non-significant for the project. An alternative to the proposed action was developed by the Interdisciplinary Team to respond to various internal issues and concerns that developed during the planning process. These included a need to pretreat fuels before burning, increase the acres of prescribed fire treatment, provide for maintenance burning (one prescribed burn treatment) after the first phase of treatments, and to change the type of treatment adjacent to private lands.

Alternatives Considered but Eliminated from Detailed Analysis

A prescribed burn only alternative was considered to address the objective of fuel reduction in the project area. This would reduce ground fuels but not ladder fuels, and would not change the low ground to base heights or stand density conditions. Therefore it would not entirely meet all established objectives for fuels reduction as stated in the purpose and need in Chapter 1.

A thin and chip only alternative was considered to reduce fuels minimizing the impacts to air quality, and the risk of escaped prescribed fires. This would reduce ladder fuels and continuous canopies and thus crown fire potential, but ground fuels and potential surface fire intensity would increase because thinning residue is chipped and broadcast on site. Therefore it would not entirely meet all established objectives for fuels reduction as stated in the purpose and need in Chapter 1.

A thin, lop and scatter only alternative was considered to reduce fuels minimizing the impacts to air quality, and the risk of escaped prescribed fires. This would reduce ladder fuels and continuous canopies and thus crown fire potential, but ground fuel and potential wildfire intensity would increase because thinning residue is lopped and scattered on site. Therefore this alternative would not entirely meet the objectives of the project.

Alternatives Considered in Detail

This section describes the alternatives analyzed in detail in this EA, Alternative A, No Action, Alternative B, Proposed Action, and Alternative C, the Modified Proposed Action. All treatment acreages are estimates, based on field reconnaissance. Acre estimates would be continued to be refined, based on additional fieldwork, and may vary after unit layout and protection features are applied. Table 2-1 shows the proposed acreage of treatment activity for each of the three alternatives.

Alternative A -- No Action

The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14d) requires that a "No Action" alternative be analyzed in every EA. This alternative represents the existing condition against which the other alternatives are compared. It provides a baseline to compare the magnitude of environmental effects of the action alternatives.

Alternative B -- The Proposed Action

The objective of this alternative is to reduce the crown fire hazard to private land, homes, people, and improvements within the Victorine WUI. It would also reduce the probability of crown-fire development, which could threaten life and property to the north and northeast in the Blue Ridge WUI (the prevailing wind direction is from the southwest). A map showing treatments proposed in Alternative B is provided in Figure 2-1.

Alternative B includes the following treatments:

<u>Maintenance Thin and Burn: 890 previously treated acres</u>
This treatment includes thinning of ponderosa pines up to 12” diameter at breast height (DBH) with a spacing guide of at least 15 feet between tree boles or three feet between crowns. Slash would be lopped, scattered, and bucked to a depth of no more than 2 feet. Slash would be burned with low/moderate intensity prescribed fire to remove needles, small twigs, and branches. This treatment would be applied to previously treated areas[6] with moderate crown fire hazard to reduce the hazard to low.

<u>Maintenance Burn: 911 previously treated acres</u>
This treatment involves low intensity prescribed burning of previously thinned and/or burned areas. This treatment would be applied to previously treated areas with low crown fire hazard to maintain the existing low fire hazard.

<u>Broadcast Burn: 4,915 previously untreated acres</u>
This treatment applies prescribed fire to areas with moderate stand densities and low to moderate dead-down fuel loading. The broadcast burn treatment involves low to moderate intensity prescribed broadcast burning that may result in up to 10 percent conifer mortality. This treatment is prescribed for areas with low to moderate canopy closure and low to moderate surface fuel loading. The broadcast burn treatment is applied to stands

[6] Previously treated areas are areas that received understory thinning and/or burning within the last 20 years.

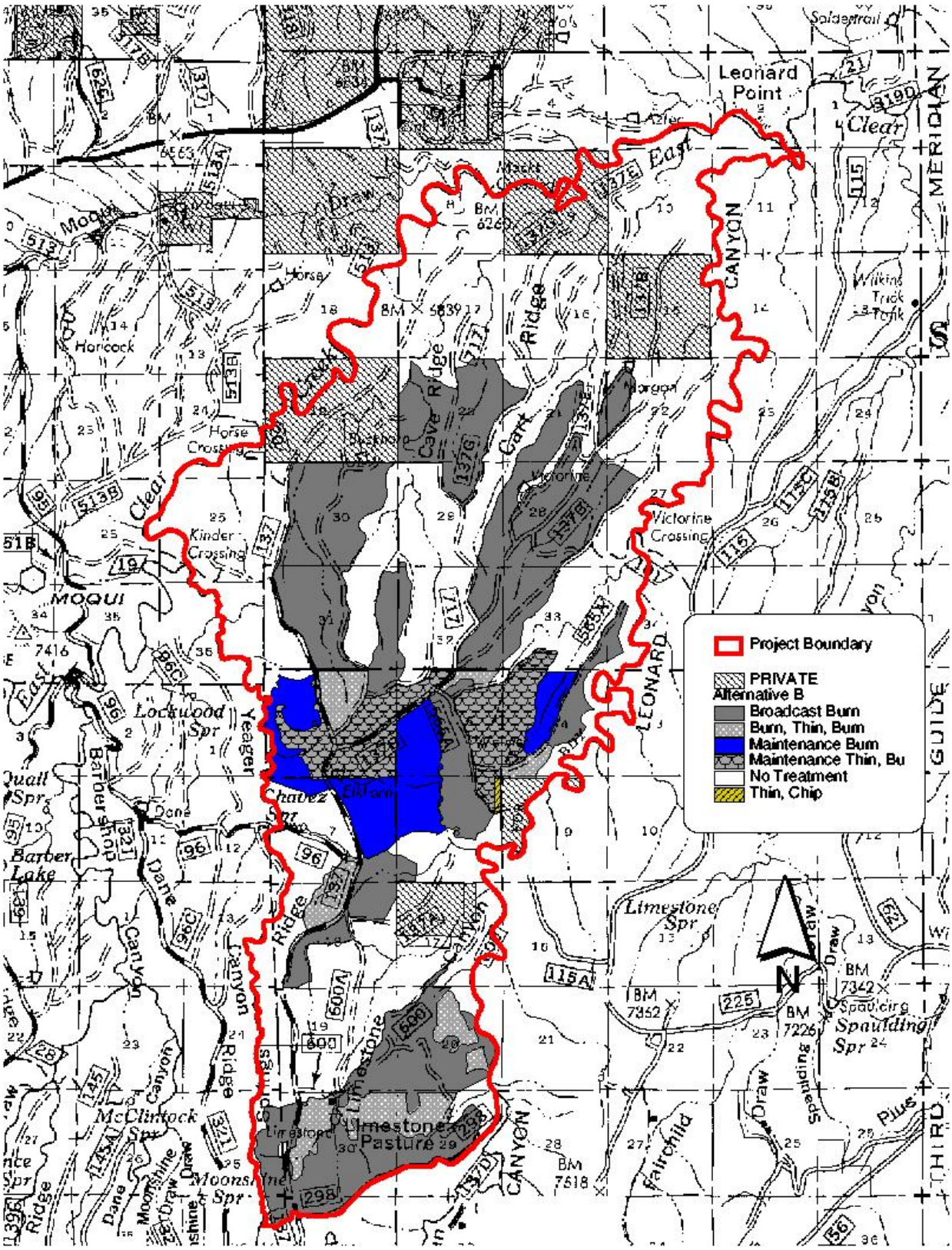


Figure 2-1: Alternative B -- Proposed Action

with low to moderate crown fire hazard to maintain or reduce the existing crown fire hazard respectively by reducing surface fuel loading and, to a more limited extent, by reducing live ladder fuels.

Burn/Thin/Burn: 782 previously untreated acres
This is a three-stage process of fuel reduction in areas with high to moderate crown fire hazard due to high existing dead-down fuel loading, high stand density, and low average crown base heights. The first activity in this treatment is to broadcast burn to reduce the existing dead-down surface fuel loading. Thinning of ponderosa pines up to 12" DBH with a spacing guide of at least 15 feet between tree boles or three feet between crowns would be the second treatment. Slash would be lopped, scattered, and bucked to a depth of no more than 2 feet. Finally, the slash would be burned with low/moderate intensity prescribed fire to remove needles, small twigs, and branches.

Thin and Chip Slash: 10 acres
This treatment is applied immediately adjacent to developed private land to reduce visual and smoke impacts from prescribed burning. The treatment entails understory thinning as described above with chipping of slash rather than lopping and/or burning. Chips are broadcast on site. The treatment would lower crown fire hazard by reducing canopy closure and raising crown base heights.

Alternative C -- Modified Proposed Action Alternative

The objective of this alternative is to reduce the crown fire hazard to private land, homes, people, and improvements within the Victorine WUI. It would also reduce the probability of crown-fire development, which could threaten life and property to the north and northeast in the Blue Ridge WUI (the prevailing wind direction is from the southwest). A map showing treatments proposed in Alternative C is provided in Figure 2-2.

Alternative C includes the following treatments:

Maintenance Thin/Burn: 805 previously treated acres
The maintenance thin/burn treatment description is the same as described in Alternative B. There are 85 fewer acres of this treatment proposed in Alternative C as compared to Alternative B.

Maintenance Burn: 839 previously treated acres
The maintenance burn treatment description is the same as described in Alternative B. There are 72 fewer acres of this treatment proposed in Alternative C as compared to Alternative B.

Broadcast Burn: 6,083 previously untreated acres
The broadcast burn treatment description is the same as described in Alternative B above with the following exception. Pretreatment of fuels[7] would occur within some of the

[7] Pretreatment of fuels, in this case, involves the selective felling of ponderosa pine trees less than 9 inches diameter at breast height

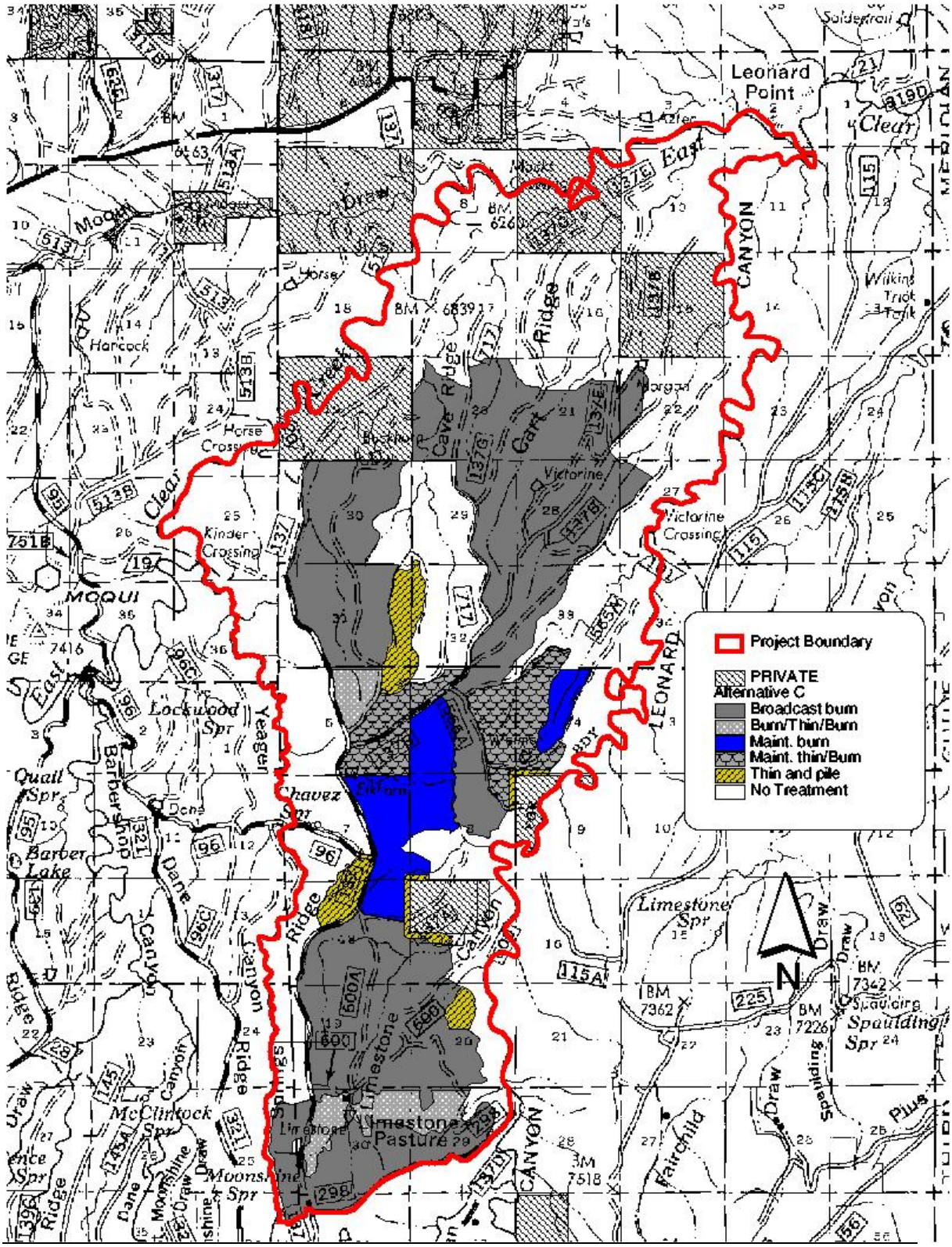


Figure 2-2: Alternative C Modified Proposed Action Initial Entry Treatments

from within the clumps that are to receive fuel preparation. Felled trees are left intact and in place to create fuel ladders, resulting in isolated occurrences of crown consumption and/or high crown scorch within their immediate vicinity.

clumps in order to cause patches of mortality ranging from less than one tenth of an acre to half an acre in size. Pretreatment and resultant clump thinning with fire would occur on approximately 10-20 percent of the proposed 6,083 broadcast burn treatment acres and could result in up to 20 percent conifer mortality where applied. There are 1,068 more broadcast burn acres proposed in Alternative C in comparison to Alternative B.

Burn/Thin/Burn: 468 previously untreated acres
The burn/thin/burn treatment description is the same as described in Alternative B. There are 314 fewer acres of this treatment proposed in Alternative C as compared to Alternative B.

Thin and Pile: 483 acres
This treatment is applied to areas immediately adjacent to developed private land, within or adjacent to sensitive wildlife habitat, and in areas with very high existing surface fuel loading. This treatment is utilized to improve control of fire effects adjacent to private land and residual stand structure. The treatment consists of thinning trees up to 12 inches DBH and piling of slash. Sites adjacent to private property would be hand piled. Sites with excessive pre-existing surface fuel loading that are not immediately adjacent to private property would be hand or machine piled. Some of the pre-existing course woody fuel would be incorporated into piles with thinning slash on these sites. Piles would be burned.

Maintenance Burning:
This treatment involves broadcast burning of 8,407 acres (Figure 2-3). Thin and pile treatments located within old growth and goshawk habitat would be excluded (271 acres). This treatment is intended to mimic the historic fire regime in both fire occurrence and fire severity and intensity. The maintenance burns would be conducted within 3 to 12 years after completion of the initial treatments and would be implemented as needed to keep surface fuel loading low, sustain a low crown fire hazard, and achieve desired conditions of ground to live crown base heights, stand density, and dead fuel loading (Chapter 1, p. 2-3).

Table 2-1: Acreage of Proposed Activity by Alternative for the Victorine WUI Project.

Proposed Activities	Alternative A	Alternative B	Alternative C
Maintenance Thin/Burn previously treated acres	0 acres	890 acres	805 acres
Maintenance Burn previously treated acres.	0 acres	911 acres	839 acres
Broadcast Burn previously untreated acres	0 acres	4,915 acres	6,083 acres
Burn/Thin/Burn previously untreated acres	0 acres	782 acres	468 acres
Subtotal acres	*0*	*7,498*	*8,195*
Thin and Chip	0 acres	10 acres	0 acres
Thin and Pile	0 acres	0 acres	483 acres
Subtotal acres	*0*	*7,508*	*8,678*
Maintenance Burn all treatment areas within 3 to 12 years after the completion of individual treatments	0 acres	0 acres	8,407 acres

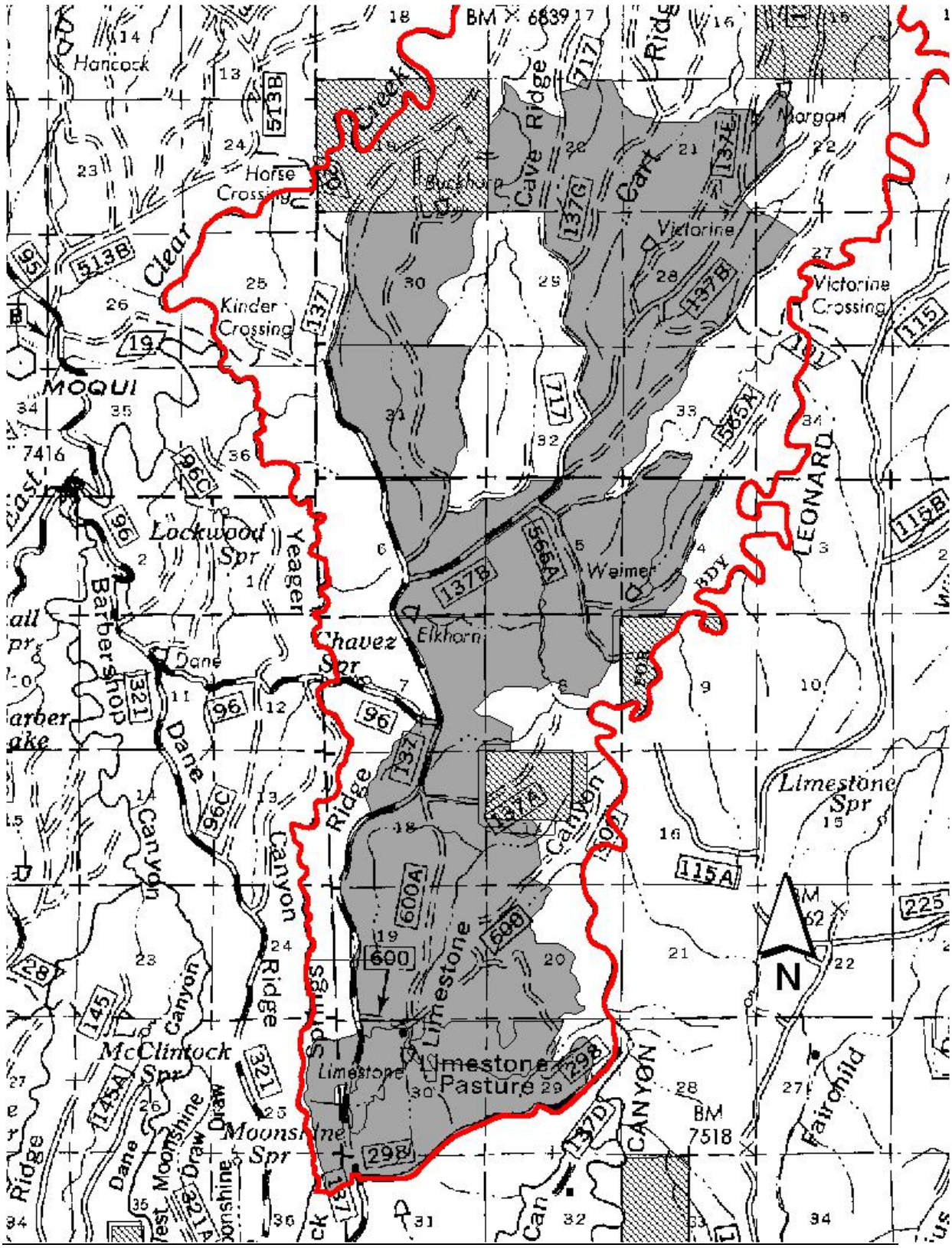


Figure 2-3: Proposed Secondary Maintenance Burning

The gray area of the map indicates the initial entry treatment acres that are proposed for maintenance burning under Alternative C.

Project Implementation Methods Common to All Action Alternatives

Implementation of the different aspects of the project action alternatives B and C would be accomplished through various methods or combinations of methods, such as contracts formal agreements, volunteers, community-service crews, and Forest Service work crews. The type of contract, agreement, or work crews selected for use would be part of an overall project implementation strategy based on methods that best meet each project goal or objective, combined with Federal Acquisitions Regulations, and funding available for implementation. The types of contracts most commonly used for fuel reduction treatments are stewardship, service and timber sale contracts. The methods of implementation are not a decision to be made on this EA.

Resource Protection Measures Common to All Action Alternatives

Resource protection measures were developed to reduce, avoid and/or compensate for the potential impacts the proposed activities may cause. These measures would be applied to Alternatives B and C. Environmental effects described in Chapter 3 of the EA assume that these measures would be implemented.

In addition to specific resource protection measures prescribed for both action alternatives, all management activities implemented would be consistent with Forest Plan Standards and Guidelines and Regional Best Management Practices (BMP's). BMPs are found in the U.S. Forest Service Southwestern Region's Soil and Water Conservation Handbook (FSH 2509.22). Applicable BMPs would be incorporated into the project based on site-specific needs to prevent resource damage. All BMPs and other resource protection measures would be incorporated into project implementation including contract specifications for service or other contracts such as Timber Sale Contracts.

Table 2-2 lists protection measures by resource, how the practice would be specifically implemented in the project and the purpose for the specific protection measure.

Table 2-2: Resource Protection Measures for Alternatives B and C for the Victorine WUI Project.

#	Soil and Water (SW)	Purpose
SW1	**BMP's 25.13 and Control of Sanitation Facilities** outline methods for mitigating hazardous materials and sanitation facilitates. The Timber Sale Clause (TSC) clause to implement these actions is **BT6.34 and BT6.341**.	To minimize impacts to water quality from contractor's camping sites and from hazardous materials spills.
SW2	Do not operate mechanized equipment when ground conditions are wet. Mechanized equipment includes mechanized shear, and bulldozer with brush rake.	To minimize the potential for soil compaction from mechanized equipment.

SW3	Design fire prescriptions to minimize high soil temperatures. High intensity fire should occur within the range of < 1 to 5% of the area.	Fire prescriptions should be designed so that soil and fuel moisture temperatures are such that fire intensity is minimized and soil health and productivity are maintained.
SW4	Provide a one-chain buffer (66 feet) on each side of the non-riparian streamcourse to filter sediments from the proposed burn on Terrestrial Ecological Survey (TES) map units 549 and 550, and one-half chain wide on each side of the non-riparian stream reaches in all other map units. These stream reaches will be designated as protected streamcourses.	To filter sediments that may occur from the removal of ground cover from prescribed fire.
SW5	No thinning or burning within riparian buffer strips. Do not ignite fire within one chain (66 feet) of riparian filter strips and within one-half chain of the non-riparian streamcourses.	To keep woody material in drainages to dissipate stream energy and to filter sediments that may occur from the removal of ground cover from fire.
SW6	Use a brush rake when machine piling.	To minimize soil surface disturbance during machine piling activities.
SW7	A minimum of 5 to 10 tons of coarse woody debris ≥3 inches diameter per acre will be left on-site on all burn unit sites not directly adjacent (within ¼ mile) of private lands.	To promote long-term soil productivity.
SW8	Do not operate equipment in designated protected streamcourses or designated streamcourse buffer strips.	To minimize sediment movement to streamcourses and maintain water quality.
#	**Visual Quality (VQ)**	**Purpose**
VQ1	Stumps would be cut 6 inches or less from the ground within 50 feet of FS Road 96 and FS 137 south of the junction with FS Road 96 to the southern project boundary. Stumps would be cut 6 inches or less from the ground 100 feet from developed private lands.	Primarily to minimize visual impacts along public travel corridors and adjacent to private property. Cutting stumps low to the ground also improves public safety and firefighter safety relative to potential fall injuries.
#	**Health and Safety (HS)**	**Purpose**
HS1	Notify the public by placing signs in conspicuous locations at least one week prior to and during prescribed burning. This would include maps of the boundaries of the scheduled burns.	Minimize impacts to campers and hunters during prescribed burns that coincide with hunting seasons.
HS2	Notify smoke-sensitive individuals and other private landowners in the area through the media (signs, newsletters, personal communication etc.) prior to prescribed burns.	Provide public information and notification about prescribed fire implementation.
#	**Fire and Fuels (FF)**	**Purpose**
FF1	In thin and pile areas: pile slash in openings, outside drip lines of retained trees whenever possible.	To minimize potential damage to roots, stems, and crowns of retained trees from pile burning.
FF2	Utilize evening and early morning fire patrols and lookouts during prescribed burns to check on burn status and weather conditions.	To minimize the risk of escaped fire in the event of weather changes.
#	**Wildlife (WL)**	**Purpose**
WL1	No project activity within ½ mile of Protected Activity Centers (PACs) during MSO breeding (March 1 – August 31). No project activity would occur within the nest buffer zone for PAC #040708.	Protect T&E species from disturbance during breeding season
WL2	No project activity within Post-fledgling Family Areas) PFAs during goshawk breeding (March 1 – September 30).	Protect sensitive species from disturbance during breeding season.
WL3	No project activity within 0.6 mile of a peregrine eyrie during the breeding season (March 1 to June 30).	Protect sensitive species from disturbance during the breeding season.
WL4	Corridors and cover in drainages would be maintained for use by wildlife.	Provide for wildlife needs
WL5	Direct ignition of logs and snags would be avoided during prescribed	Retain logs and snags on the landscape.

	burning.	
WL6	Many of the large logs, snags, and large oak trees would be lined prior to burning in MSO PACs, goshawk nest stands, and old growth. No more than 200 acres would be burned in a PAC per year.	Retain habitat components important to wildlife, and limit changes in MSO habitat per year.
WL7	Within MSO PACs, trees over 9” dbh would not be cut during thinning treatments. No thinning within 100 acre nest buffers. Leave variable spacing of trees.	Maintain the integrity of MSO habitat.
WL8	Cut trees and slash would be placed away from large oak and yellow ponderosa pine trees and clumps of oak trees prior to prescribed burning.	Reduce the mortality in oak and old ponderosa pine trees caused by prescribed fire treatments.
WL9	Retain clumpy nature of pine stands and interlocking crowns for trees greater than 12” dbh during thinning treatments, consistent with meeting fuel reduction objectives.	Retain habitat components important for wildlife, especially squirrels, goshawks, owls, and other birds.
WL10	Prescribed burns in MSO PACs and target threshold areas will aim to retain 90% of snags > 14” DBH; 75% of large logs/acre; 95% of pine trees > 18” DBH and Gambel oak trees > 14” DRC; 80% of Gambel oaks 5”-10” DRC; and 95% of total basal area and canopy closure.	Maintain the integrity of MSO habitat.
WL11	Prescribed burns in restricted habitat will aim to retain 80% of snags > 14” DBH; 60% of large logs/acre; 95% of pine trees > 18” DBH and Gambel oak trees > 14” DRC; 75% of Gambel oaks 5”-10” DRC; and 90% of total basal area and canopy closure.	Retain habitat components important to wildlife.
WL12	Thin developing old growth with a special prescription that is designed to promote increased growth rates and maintain and promote old growth characteristics.	Promote old growth characteristics and accelerate the development of these stands into existing old growth stands.
#	**Aquatics and Fisheries**	**Purpose**
AF1	No refueling of equipment or drip torch fuel would occur within 50 feet of streamcourses or water bodies.	Prevention from impacts to watercourses from inadvertent small spills.
AF2	Existing and activity fuels would be left in protected streamcourses. No channel-spanning wood would be bucked or removed from the stream channel.	Maintain course wood in channel.
AF3	No vegetation that overhangs live streams would be removed from waterbodies containing Little Colorado spinedace.	Protect riparian vegetation along live streams.
#	**Vegetation Management**	**Purpose**
VM1	The thin from below treatment activities would be scheduled between July and December, if conditions warrant or monitoring indicates a need. Minimize creation of green slash between January and June.	To prevent pine engraver beetles (*Ips* spp.) populations from increasing to levels that may cause undue overstory mortality within and adjacent to thinned stands.
#	**Range**	**Purpose**
RM1	Coordinate thinning and burning activities with range permittees.	To minimize disturbance to both the stand improvement activities and to grazing management.
RM2	Avoid fences, if possible, while implementing thinning and burning activities. If not possible, remove portion of fences affected and reconstruct immediately, to proper standards, following project activities.	Avoid or repair damage to range improvements and assist in keeping livestock in proper pastures.
#	**Invasive Plants**	**Purpose**
NW1	Avoid or remove existing sources of weed seed and propagules.	To prevent new weed infestations and the spread of existing weeds.

NW2	Incorporate weed prevention and control into project layout, design, and implementation. Clean equipment and vehicles prior to entry on forest. Clean vehicles, machinery and tools before moving from infested areas into uninfested areas. Incorporate equipment-cleaning clauses such as C6.36 that is used in timber sale contracts into all implementation contracts.	To prevent new weed infestations and the spread of existing weeds, and to control the spread of existing weeds.
NW3	Where project disturbance creates bare ground, consistent with project objectives, re-establish vegetation to prevent conditions to establish weeds.	To prevent establishment of weeds.
NW4	Retain native vegetation in and around project activities and keep soil disturbance to a minimum consistent with project objectives.	To prevent establishment of weeds.
NW5	Native and certified weed-free plant seeds, will be used wherever seeding is done.	To prevent the establishment of exotic plant species.
#	**Sensitive Plants**	**Purpose**
SP1	Site-specific surveys for sensitive plants will be conducted prior to soil-disturbing activities to protect known and new populations.	To protect sensitive plant populations.
#	**Heritage Resources**	**Purpose**
HR1	Avoid previously undocumented archaeological sites; if discovered, report to District or Forest Archaeologist. Activities would not be resumed until adequate protective measures are developed and specified. Provisions for the protection of Cultural Resources would be included in any contract implemented.	Protection of significant, undocumented Historic Properties in the project area.
HR2	Thin by hand within site boundaries and remove slash by hand to locations outside of site boundaries on all sites.	Minimize potential damage from ground disturbing activities and high intensity fire to sites.
HR3	Avoid historic sites during implementation of broadcast burning.	Protect significant flammable components of historic sites.
HR4	Any fire lines constructed by a bulldozer during prescribed burning would be surveyed prior to construction.	Monitor and protect heritage sites.
#	**Air Quality**	**Purpose**
AQ1	All burning would be coordinated daily with the Arizona Department of Environmental Quality (ADEQ). Burning would not take place on any portion of the project without prior approval from ADEQ. Coordination with ADEQ will take place through the Coconino National Forest Zone Dispatch Center and the Prescribed Burn Boss.	To ensure that smoke management objectives are met.
AQ2	Control the duration of heavy smoke conditions (1-3 days). The following guidelines would be initiated when heavy smoke conditions are occurring. – New ignitions should not occur for more than three concurrent days within the project area unless overnight smoke conditions in affected populated areas is known to be minimal. – Burning would be conducted early in the day or at night to allow heavy materials time to be consumed, and give smoke most of the day to disperse. – Avoid burning on Saturday and/or Sunday and holidays unless ventilation is fair or better. – Smoke from prescribed burning activities of adjacent Forests would be monitored and considered in scheduling prescribed burn ignitions. – Burn with winds that would carry smoke away from the Verde and Lower Salt River Airshed and into the Little Colorado Airshed.	To minimize impacts to residents of the Blue Ridge area, the Verde Airshed and to recreationists caused by heavy smoke conditions from prescribe burning To minimize the duration of substantial smoke impacts to affected areas. To lessen the potential impacts of smoke from nighttime inversions. To lessen impacts of smoke during the weekend when the most impacts to homeowners and recreationists would occur. To minimize the cumulative impacts of smoke from multiple sources within the same airshed. To prevent smoke impacts to more sensitive airsheds south of the project area.

Monitoring

Tables 2-3 and 2-4 list required and project-specific monitoring that would be completed for the project.

Table 2-3: Required Monitoring for Action Alternatives B and C of the Victorine WUI Project.

Who	Monitoring	When
District Archaeologist	Project administrators must notify the District Archaeologist so that identified sites can be marked for avoidance in the field, and so that a project monitoring schedule can be set up.	Prior to project implementation
District Archaeologist or a certified Cultural Resource Specialist	Monitor the project implementation near identified sites and report the results of such monitoring in writing to the District or Forest Archaeologist.	During implementation
District Wildlife Crew	MSO PACs to be treated will be monitored pre- and post-treatment. Survey techniques will follow the current approved Mexican spotted owl survey protocol.	Within one year prior to treatment and within one year after completion of treatments
	MSO restricted habitat that is to be treated will be re-surveyed prior to treatment implementation. Survey techniques will follow the current approved Mexican spotted owl survey protocol.	Within one year prior to treatment
	Microhabitat monitoring within MSO habitat pre- and post-treatment. Current US Forest Service Region 3 monitoring protocol would be followed.	Pre-treatment monitoring would occur prior to implementation, post-treatment monitoring to occur within 2 years following completion of all treatments for the site.

Table 2-4: Project-Specific Monitoring for Action Alternatives B and C of the Victorine WUI Project

Who	Monitoring	When
District Staff	Thin from below and prescribed fire treatments would be monitored to determine if the treatments meet the project objective and are within acceptable parameters of the silvicultural and burn plan prescriptions	During and after implementation
District Silviculturist	Monitor the project and surrounding areas for beetle activity.	During and after implementation
District Crews	Annual surveys and treatment of all Category ‘A’ & ‘B’ invasive plant species.	During and for at least three years after implementation

Comparison of Alternatives

The proposed treatment activities in both Alternatives B and C are quite similar (Table 2-1). The key differences between the two action alternatives, aside from acreage, are as follows:

- The Broadcast Burn treatment described in Alternative C proposes site pretreatment of fuels that is not proposed in the Broadcast Burn treatment in Alternative B. There is also a substantial increase in proposed acreage.
- The Thin and Chip treatment proposed in Alternative B is excluded from Alternative C.
- The Thin and Pile treatment proposed in Alternative C is not proposed in Alternative B.
- The Maintenance Burning of initial entry treatment acres proposed in Alternative C is not proposed in Alternative B

Fuel pretreatment is included in the broadcast burn treatment in Alternative C to address a concern that low intensity broadcast burning alone in young stands of ponderosa pine regeneration with light ground fuels would not alter stand characteristics enough to reduce current and future crown fire hazard. Additional acreage of proposed broadcast burning activity within Alternative C is proposed to address a concern that the location and amount of broadcast burning in Alternative B provided inadequate protection to private property within the project area. Thinning, piling and burning is proposed in Alternative C to address a concern that broadcast burning may pose a risk to private property along property boundaries with the existing fuel loads or with slash fuel loads. The Alternative B thin and chip acres are included in the Alternative C thin and pile acres because piling costs the same or less than chipping and ultimately removes more fuel from the site. Thinning and piling also addresses a concern that broadcast burning of thinning slash in particular sensitive habitats would cause undesirable losses of logs and snags. Maintenance burning of initial entry treatments is introduced in Alternative C to address a concern that the reduction of crown fire hazard gained by initial entry treatments would not persist without active management of future surface fuel accumulations. Other differences in treatment locations and acreages between the two action alternatives occurred primarily to address potential effects to Mexican spotted owl and Little Colorado spinedace habitats. The rest of the differences in proposed treatment acreages are to lessen the potential for spread of invasive weeds from fire line construction. This was accomplished by using existing open and closed roads for treatment area boundaries wherever possible to limit the need for fire line construction.

The alternatives are compared based on Objectives and Units of Measure, as described in Chapter 1. Information in the table is focused on activities contributing to objective accomplishment, which can be distinguished quantitatively or qualitatively among alternatives. The information in Table 2-5 is summarized from the Vegetation, and Fire and Fuels sections in Chapter 3, and the "*Fire, Fuels and Air Quality Report for Victorine WUI*" by Jerman dated October 19, 2004 (PR# SR5) and the "*Vegetation Analysis for Victorine WUI*" by Koyiyumptewa dated October 21, 2004 (PR# SR20).

Table 2-5. Objective Accomplishment by Alternative for the Victorine WUI Project

Objective: Reduce crown fire hazard in the Victorine WUI through thinning and prescribed burning.			
Measure	**Alternative A No Action**	**Alternative B Proposed Action**	**Alternative C Modified Proposed Action**
Change in surface fuels (tons/acre)	No immediate change. Surface fuels would gradually increase over time in all stands.	Surface fuel loading would increase over the short term in thinned stands and decrease in burn only stands. Over the long term, surface fuel loading would be reduced after prescribed burning is completed on all proposed treatment acres with the exception of the 10 acres of proposed chipping, where it would increase. About 7,500 acres of surface fuels would be reduced or maintained at low levels with this alternative.	Surface fuel loading would increase over the short term in thinned stands and decrease in burn only stands. Over the long term, surface fuel loading would be reduced after prescribed burning is completed on all proposed initial entry treatment acres. About 8,680 acres of surface fuels would be reduced or maintained at low levels with this alternative. Maintenance burning of initial entry treatments would keep surface fuel loading low well into the future, extending the effect of surface fuel reduction for a longer duration than Alternative B on about 8,407 acres.
Change in stand density (trees/acre)	No immediate change. Stand density would gradually increase over time in all stands.	In the short term, stand density would be reduced substantially in thinned stands and minimally in burn only stands. Stand density would increase gradually over the long run in all stands as overstory trees grow and pine regeneration fills in available space in the understory. Thinning would substantially reduce stand density on about 1,680 acres with this alternative.	In the short term, stand density would be reduced substantially in thinned stands and minimally to moderately in burn only stands. Stand density would increase gradually over the long run in all stands as overstory trees grow. Maintenance burning of initial entry treatments would kill much of the pine regeneration and a negligible number of saplings, poles, and larger trees, keeping stand densities lower over the long term and for a longer time than Alternative B. Thinning would substantially reduce stand density on about 1,760 acres with this alternative.

Measure	Alternative A No Action	Alternative B Proposed Action	Alternative C Modified Proposed Action
Change in ground to live crown base height (ft)	No immediate change. Ground to Live Crown Base height (GLCB) would decrease in currently low-density stands over time as pine regeneration fills in the understory. GLBC would remain stable or slowly increase in currently high-density stands over time due to mortality and self-pruning.	GLCB would increase substantially over the short term in thin/pile and thin/burn stands and would increase negligibly in burn only stands. Over the long term, GLCB would decrease in low-density stands as pine regeneration fills in the understory. GLBC would remain stable or slowly increase in high-density stands due to mortality and self-pruning. Thinning and burning would increase GLCB on about 7,500 acres with this alternative.	GLCB would increase substantially over the short term in thin/pile and thin/burn stands and variably in burn only stands. Over the long term, increased GLCB would be maintained and occasionally increased in stands subject to maintenance burning due to mortality of pine regeneration and scorching of low foliage in overstory trees. Thinning and burning would increase GLCB on about 8,680 acres with the initial entry treatments of this alternative. Maintenance burning of initial entry treatments would sustain or increase GLCB beyond the effective timeframe of Alternative B on about 8,407 acres.
Achievement of Stated Objective	This alternative does not meet the stated objective in the short or long term.	This alternative meets the stated objective over the short term but only partially over the long term.	This alternative meets the stated objective over the short and long term.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

The information pertaining to the affected environment and effects of the alternatives are summarized from other documents, including specialist reports. The planning record includes all project-specific information including specialist reports, ecosystem analyses, and other results of project-related investigations. The record also contains information resulting from public involvement efforts. The planning record is located at the Mogollon Rim Ranger District at the Blue Ridge Ranger Station in Happy Jack, Arizona and is available for review during regular business hours.

Past, Ongoing and Reasonably Foreseeable Future Actions

Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. Past, present and reasonably foreseeable future actions within the Victorine WUI project area and the Upper Clear Creek 5th code watershed are described in Tables 3-1 and 3-2 below. Projects listed are on the Coconino National Forest except where otherwise noted.

This section discloses actions considered in the cumulative effects sections of each resource area evaluated in Chapter 3 of the EA. In most cases, past and ongoing activities are incorporated into each resource's existing conditions because they help explain the current condition of the resource. That is, past and ongoing activities are described in the context of how these actions affect present conditions. Similarly, foreseeable future actions are evaluated as to how they would increase, reduce or not change conditions for the resource.

Tables 3-1 and 3-2 list projects that were evaluated by each resource within their scope of analysis. Past actions are those that have been implemented. For most resources, the time frame evaluated for effects of past actions ranged from 10 to 20 years. Effects to vegetation structural stage from older timber sales that occurred more than 30 years ago in the 1970s along with past private timber harvest in the area (Aztec Land and Cattle Company) were considered by vegetation and wildlife specialists. Ongoing actions are those that have Decisions made and are ready to implement or are being implemented. Projects that are being appealed are also included. Reasonably foreseeable future actions are those projects that are in the planning stages and have developed a proposed action or alternatives, but a Decision has not been made.

Many activities and projects occur in the project area such as road maintenance, manual treatment of noxious weeds, roadside hazard tree removal, recreational use, hunting, etc. These actions are limited in scope and impact, and do not contribute to cumulative effects.

Table 3-1. Past Actions in the Victorine Project area or the Upper Clear Creek Watershed that are Considered by Various Resources

Past Actions			
Project, Completion Date	**Description**	**Acres**	**Evaluated by What Resources[8]**
Aztec Land and Cattle Company, prior to 1982	Timber harvest, >12" DBH overstory removals. Included pulpwood harvests and reforestation.	Unknown	VM, WL
Victorine, Buck Springs, and Colorado Pulpwood Timber Sales, 1970s	Timber harvest, >12" DBH partial overstory removals. Included pulpwood harvests and pre-commercial thinning for timber stand improvement.	Unknown	VM, WL
Hart Timber Sale, Apache-Sitgreaves, 1992	Timber harvest	2,153	WL
Buckhorn Timber Sale, 1993	Timber harvest, >12" DBH partial overstory removals, and pre-commercial thinning	4,764	FF, VM, WL
Hospital Timber Sale, 1994	Timber harvest, >12" DBH partial overstory removals	1,065	VM, SW, WL
Leonard Timber Sale, 1994	Timber harvest, >12" DBH partial overstory removals	2,354	FF, VM, SW, WL
Grama Timber Sale, Apache-Sitgreaves, 1994	Timber harvest, >12" DBH partial overstory removals	7,869	SW, WL
Barber Timber Sale, 1995	Timber harvest, >12" DBH partial overstory removals	1,308	SW, WL
Lockwood Timber Sale, 1995	Timber harvest, >12" DBH partial overstory removals	1,644	SW, WL
Merritt Timber Sale, 1995	Timber harvest, >12" DBH partial overstory removals	1,479	SW, WL
Limestone Timber Sale, 1996	Timber harvest, >12" DBH partial overstory removals, and precommercial thinning.	1,342	FF, VM, SW, WL

[8] FF = Fire/Fuels; VM = Vegetation/Silviculture; SW = Soil/Water; WL = Wildlife

Table 3-2. Ongoing and Future Actions in the Victorine Project area or the Upper Clear Creek Watershed that are Considered by Various Resources

Ongoing Actions		
Project & Implementation Year	**Description**	**Evaluated by What Resources**
Rim Christmas Tree Cutting, Annually	200 acres of trees < 10"DBH cut. Not mechanized.	SW, WL
Maple Draw Restoration Project, ongoing	Thinning and prescribed fire. Fencing. 34 acres. Non-mechanized.	SW
Gentry Timber Sale, Apache-Sitgreaves, Ongoing	Timber harvest, 2,855 acres	SW, WL
Wiggins Timber Sale, Apache-Sitgreaves, Ongoing	Timber harvest, 2,550 acres	SW, WL
U-Bar Timber Sale, ongoing	Timber harvest, 1,889 acres.	SW
M-C Multiproduct Sale, Ongoing	Timber harvest, 580 acres	SW, WL
Pack Rat Fire Salvage, Ongoing	550 acres of salvage of fire killed trees, mechanized.	SW, WL
Blue Ridge Urban Interface Project, ongoing	11,600 acres thinning, 14,376 acres of prescribed burning.	SW, WL
Buck Springs Range Analysis and Allotment Management Plan, 2005	~200 acres of pre-commercial thinning. Non-mechanized. No burning.	FF, VM
Bar T Bar and Anderson Springs Range Allotment Area Assessment EIS 2005	Grazing management and improvements to rangelands. Includes prescribed fire and tree removal over ~49,000 acres.	WL
Reasonably Foreseeable Future Actions		
Project & Projected Implementation	**Description**	**Evaluated by What Resources**
East Clear Creek Watershed Health Improvement Project, 2005	Comprehensive fuel reduction, and watershed improvement project within the Upper Clear Creek 5th code watershed (70,000 acre analysis area). Prescribed burning ~ 23,400 acres. Pre-commercial thinning ~ 9,600 acres. Commercial thinning ~ 1,722ac. Meadow and upland thinning ~413 ac. Mechanized and non-mechanized thinning. Various other stream restoration, elk exclosures, road designation, closure, decommissioning, upgrades and stormproofing. Overlap with Victorine project area includes 100 acres along Forest Road 137 to create fuel breaks, thinning of ~16 ac. of ponderosa pine around Limestone Spring to improve water yield, and some of the road–related activities.	FF, VM, SW, WL
Long Tom Allotment Management Plan, EA, Apache-Sitgreaves, 2005	Grazing allotment analysis, Black Mesa District.	WL
Deer Lake Aspen Thinning, Apache-Sitgreaves, 2005	Removal of encroaching pine from aspen area, 43 acres.	WL
Cross Country Use of Motorized Vehicles in Five Arizona National Forest, FEIS, 2005-2006	Forest plan amendments to manage OHV use on the forests.	WL

Fire and Fuels

The following section pertaining to the fuels resource, affected environment and effects of the alternatives is summarized from the *Fire, Fuels and Air Quality Report*, by Jerman, dated October, 2004 (PR# SR5).

Affected Environment

Dead and Down Fuels
Dead and down fuel loadings (surface fuels) including duff, litter, and course woody debris, range across the project area from 3 to 30+ tons per acre. Surface fuels are comprised of slash from past forest management activities (logging, pulping, and pre-commercial thinning), and from normal annual fuel accumulation (tree blow-downs, tree breakage, conifer litter, and herbaceous litter, etc.). Estimates of historic forest floor fuel loading in Southwestern ponderosa pine range from 1 - 4 tons per acre, during the period of high fire frequency prior to European settlement (Brown et al. 2000).

Live Fuels
Live fuels are primarily comprised of conifer tree crowns, shrubs and grasses. Historically, most of the project area consisted of stands of generally large diameter ponderosa pine (likely averaging 30 - 50 basal area per acre) with a well-developed herbaceous understory and scattered Gambel oak and alligator juniper (Biswell et al. 1973, Brown and Davis 1973, Cooper 1960). Aspen occurs in isolated patches in the southern end of the project area and Douglas-fir occurs on steep north and east facing slopes in the surrounding canyons. Today, the overstory is dominated by small diameter ponderosa pine stands, ranging from 100 - 150 ft^2/acre basal area over much of the project area, with scattered Gambel oak of all sizes, and an understory consisting more of pine needles and duff and much less grass than historically occurred. High stocking levels of small diameter ponderosa pine result in canopy cover, canopy fuel loads, and vertical fuel continuity (ladder fuels) that exceed historic values. As a by-product, this additional biomass produces a substantial increase in persistent surface fuel accumulation. This is due primarily to the very slow annual decomposition rate of ponderosa pine litter relative to the annual rate of accumulation ((Brown et al. 2000).

Three primary factors, ground to live crown base height (GLCB), surface fire intensity (flame length), and live foliar moisture content, determine whether or not a surface fire would transition to a crown fire. Crown bulk density (CBD, typically described as weight per given unit volume) and continuity (percent canopy cover) are stand characteristics contributing to propagation of fire through the canopy (Alexander 1988, Van Wagner, 1977) and are in general positively related to one another. Surface fire intensity and GLCB combined contribute significantly to crown fire initiation. Currently, much of the project area is comprised of stands with one of or a combination of the following stand

characteristics that contribute to moderate or high crown fire hazard: low ground to live crown base height; high canopy cover; and high surface fuel loading.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects
No treatments are planned with Alternative A that would modify the existing condition of the fuels.

Fuels, both live and dead/down, within the project area would not be affected. If a wildfire occurs during extreme fuel and weather conditions, the potential exists to eliminate much of the dead/down fuels within the fire's perimeter and to eliminate many of the live fuels through stand replacement crown fire. Areas that do experience crown fire would lose much of their live fuel loading and dead/down surface fuel loading. Fire killed trees would deteriorate due to rotting, eventually falling and becoming dead/down surface fuels.

Fuel loadings would continue to increase over time because the existing live and dead/down fuels are not treated, increasing the potential surface fire intensity, surface fire severity, and crown fire potential. The number of acres that may be affected by a high intensity, high severity fire would also increase due to increasing homogeneity of surface and aerial fuels across the entire project area. This is the result of growth of all trees that presently exist within the project area and establishment of conifer regeneration. Growth and regeneration would cause an increase in the average amount of woody biomass (limbs, twigs, pine needles, leaves, etc.) produced on every acre, contributing to increased surface fire intensity and severity over time. Growth would also increase average percent canopy closure, increasing the likelihood of a crown fire, once initiated, to advance through the forest canopy continuously. Potential for transition of surface fire to crown fire increases as surface fire intensity increases. Potential for wide spread overstory and understory mortality due to root and cambial injury increases as potential fire severity increases. Soil sterilization, soil seed bank destruction, and soil erosion also increase as potential fire severity increases.

Cumulative Effects
For the past 100+ years, it has been the policy and decision to control wildfires and prescribed burning has been limited to primarily burning of slash piles until about 10 years ago when broadcast burning began to be used on small portions of the project area. The cumulative effect has been an increase in dead/down fuel loadings (from an estimated range and average of 1-4 tons per acre historically to 3 to 30+ tons per acre currently). There has also been an increase in live fuel loadings where thinning and harvesting has not occurred recently (from an average of 30-50 basal area per acre to an average of 100+ basal area per acre). The live fuel loadings contribute significantly on an annual basis to levels of dead/down fuel loading through needle cast, self-pruning, etc. Without some

attempt to reduce live and dead fuel loadings on a controlled basis, potential for high intensity, high severity wildfire occurrence would increase on an increasing amount of acreage over time (Covington et al. 1994).

Alternative B: Proposed Action

Direct and Indirect Effects

Prescribed Burning

Prescribed burning is the application of fire to a landscape or portion of a landscape within a specific set of wind, temperature, humidity, and fuel moisture parameters that make up a "prescription" within which fire behavior and effects are predictable. Prescribed burning is used to meet specific management objectives. Prescribed burning is proposed to occur within all of the Alternative B treatments except for the Thin and Chip treatment. Burning is proposed primarily to reduce the fire hazard of existing surface fuel loads and fire hazard resulting from proposed thinning activities.

Prescribed burning would consume naturally accumulated forest litter, duff, and fine fuels in slash generated by thinning activities. Some logs, snags, and stumps would also be consumed during broadcast burning. Prescribed fire intensity is generally low except for the burning of fuel concentrations typically comprised of decomposing logs and/or stumps greater than 9 inches diameter. High severity burning, which involves the discoloration and sterilization of soils and the possible formation of hydrophobic soil layers, would be limited specifically to locations where heavy fuels (ie: stumps, logs, or other fuel concentrations) are consumed and would not affect substantial acreage.

Prescribed burning would reduce some aerial fuel loading in addition to reducing surface fuel loading. There would be some crown scorch and limited mortality of trees of all species. Mortality would be restricted primarily to seedling and sapling trees less than 5 inches DBH. Some mortality would occur in trees greater than 5 inches DBH where concentrations of dead/down fuels exist near such trees. Fuel concentrations would generate localized high fire intensity that can scorch or consume crowns of nearby and overhanging trees and damage cambium layers and roots of immediately adjacent trees. Pockets of mortality would result in canopy openings of irregular size and shape that are generally less than ¼ acre in size. Overall, less than 10% of any prescribed burn area should burn at this intensity and have high severity soil effects. Trees with basal scars at ground level may be killed by catching fire in exposed scars and burning at the base enough to cause the them to fall over or to damage enough cambium to result in mortality. Trees killed but not felled by prescribed burning would eventually fall, contributing to future course woody surface fuel loading. Small diameter fire killed trees tend to fall within 5 – 10 years after death. As a result, post-burn down woody fuel loading (greater than 3" diameter) may exceed pre-burn levels in locations where prescribed burning causes localized moderate to high tree mortality. Post treatment surface fuel loads are expected to range from 5 – 15 tons per acre on average in treatment areas that receive

initial prescribed burning treatments, and would range from 3 – 10 tons per acre after the maintenance burn treatment.
Consumption of litter and duff layers would stimulate growth of sprouting species such as Gambel oak, *Quercus gambellii*, New Mexico locust, *Robinia neomexicana*, and lupine, *Lupinus spp*., and would prepare a seedbed that is more conducive to herbaceous and conifer seed germination than currently exists. Prescribed burning would also stimulate germination of certain plant seeds such as buckbrush, *Ceanothus fendleri*, which require heat scarification to induce germination ((Brown et al. 2000). This would result in an increase in ground cover of grasses, herbs, and forbs, shrubs, and tree seedlings and sprouts after burning. Growth of tree seedlings and canopy growth of surrounding trees would eventually close or reduce the size of openings created by prescribed burning assuming no future disturbance such as fire or thinning. Prescribed burning would improve ecosystem functionality primarily by cycling nutrients from herbaceous and forest litter back into the soils and by encouraging herbaceous establishment where it currently does not exist because of deep duff and litter layers over mineral soil.

Thinning

Thinning, under this proposal, is the cutting of trees up to 12 inches DBH with residual stand density targets falling within the range of 30 – 60 square feet of basal area. Thinning of young pine trees with primarily understory and intermediate canopy position reduces aerial fuel loading (crown bulk density) and canopy cover (percent). The smallest trees in southwestern ponderosa pine forests typically form much of the lowest portion of the forest canopy. Therefore, understory thinning, the cutting down of small trees, eliminates some of the lower portion of the forest canopy increasing the average height of the residual forest canopy above the ground or surface fuel layer. Increasing ground to live crown base height (GLCB) reduces the potential for surface fires to transition into the forest canopy by increasing the distance between surface fires and the aerial fuel layer, thereby increasing the surface fire intensity required to ignite the crowns. Decreasing aerial fuel loading and canopy cover reduces the ability of fire to spread horizontally through the forest canopy if it does transition from the surface layer into the aerial layer.

Thinning rearranges live aerial fuels into dead /down surface fuels resulting in a potentially substantial increase in surface fuel loading, fuel bed depth, and fuel bed continuity. Slash fuel beds produce higher fire intensities and longer flame lengths, than the existing pine litter fuel bed under constant atmospheric conditions. Therefore, the increase of GLCB gained through thinning may be ineffective in reducing the ability of a surface fire to transition into the crowns until the fine fuels are removed from the aerial portion of the slash layer.

An indirect effect of thinning is increased insolation. This occurs because of the reduction of canopy cover, allowing sunlight to reach more of the forest floor for longer periods of time. Forest floor air temperature would increase and relative humidity would decrease relative to pretreatment conditions. Eye-level, or mid-flame, wind speeds would also increase because of the reduction of canopy cover relative to pretreatment conditions. These factors combined would decrease dead/down fuel moisture content, increase rates of spread, and potentially increase probability of ignition within the treated stands.

Reduction of canopy cover increases the amount of winter snow reaching the ground surface and reduces evaporative loss of snow (sublimation). Increasing snow accumulation would increase the amount and duration of soil water through the spring growing season. Reducing leaf area available for transpiration may also contribute to increased availability of soil water. Aerial fuel moisture content would remain high for longer periods of time due to soil water availability. Surface fuels would tend to convert to herbaceous fuels in openings, which burn with less residence time than pine litter, reducing potential fire severity. High aerial fuel moisture content increases the surface fire intensity required for crown fire ignition and although herbaceous fuels may produce high flame lengths (intensity) they are short lived and have less chance of igniting crowns than similar flame lengths from pine litter. Thinning would improve ecosystem functionality primarily by reducing tree densities, increasing average tree diameter, and by creating an open, clumpy stand structure that more closely resembles the historic stand structure and provides ample growing space for the herbaceous understory layer. Annual tree and stand growth rates would increase, resulting in quicker attainment of large trees within thinned stands. The effects of thinning described above are applicable to all stands proposed for thinning under Alternative B

Cumulative Effects

The geographic setting for the fire and fuels cumulative effects analysis would include the past, present and future timber sales, and fuel reduction activities (thinning, and prescribed burning) that have or may affect the distribution of fuels within the Victorine WUI project area. The timeframe for past actions is 20 years. Refer to Table 3-1 above for projects considered in the cumulative effects analysis for fire and fuels (FF), which is summarized from the *Fire, Fuels and Air Quality Specialist Report* by Jerman, dated October 19, 2004 (PR# SR5).

Three past timber sales (encompassing 8,460 acres in the project area) reduced aerial fuel loading and canopy cover, and reduced crown fire hazard on most of the treated acres. Natural ponderosa regeneration within the three timber sales is rapidly filling in lower portions of the aerial fuel layer and would increase crown fire hazard over time. Prescribed burning of low and moderate crown fire hazard areas and prescribed burning and thinning of moderate and high crown fire hazard areas would improve or maintain crown fire hazard at acceptable levels. Alternative B would have a beneficial cumulative effect by reducing fuels through prescribed burning in areas of these three past timber sales.

The East Clear Creek Watershed Health Improvement Project proposes to thin approximately 16 acres of ponderosa pine up to 16 inches DBH around Limestone Spring to improve water yield from the spring. This activity is the only thinning or prescribed burning activity associated with the East Clear Creek project that occurs within the Victorine project area. Prescribed burning proposed in this alternative would reduce duff depths that can prevent infiltration of precipitation into the soil and may contribute to increasing water flow from Limestone Spring. The Burn/Thin/Burn treatment that Alternative B proposes in the vicinity of Limestone spring may also increase spring flows

by reducing interception of precipitation and evapotranspiration. The Buck Springs Range Analysis and AMP proposes to understory thin less than 200 acres of small diameter ponderosa pine in the southwest corner of the Victorine project area to improve the ability to manage cattle. This thinning would occur within a portion of the Victorine broadcast burn treatment area and the slash would be burned with the same effects described above for slash burning if either of the Victorine action alternatives are selected for implementation. This is the only thinning activity associated with the Buck Springs Range Analysis and AMP that would occur within the Victorine project area. The Buck Springs thinning would result in a greater reduction of crown fire hazard on the thinned acres than would be achieved by prescribed burning alone. Burning the thinning slash generated by the proposed Buck Springs thinning may increase forage and further improve the ability to manage cattle.

Alternative C: Modified Proposed Action

Direct and Indirect Effects

The direct and indirect effects of prescribed burning are the same for the proposed treatments in Alternative C as are described above in Alternative B with the exception of the following treatments.

Broadcast Burning

Felling of small diameter ponderosa pine trees within existing dense clumps of young ponderosa pines is proposed as part of the Broadcast Burn treatment in Alternative C. This is proposed because of the addition of many stands having a young developing forest with light surface fuel loadings. The developing stands are in need of thinning to prevent stagnation of growth. The felling of small diameter pine trees to augment the surface fuel load in specific locations is therefore proposed as a way to help ensure that prescribed burning would achieve the desired amount of mortality in desirable locations. In clumps of saplings (dog-hair thickets), multiple trees may need to be felled to create the desired effect if tree crowns are sparse. In clumps of small poles, only one or two trees would likely need to be felled to create the desired effect. Felled trees would be left intact on the ground within the clump in which they originate. This would create concentrations of ladder fuels within selected clumps of sapling and small pole size trees where ladder fuels or heavy surface fuel concentrations do not currently exist. The ladder fuels would locally increase the intensity of the surface fire from the prescribed burn, resulting in isolated torching and/or scorching of ponderosa pine crowns that are immediately above and directly adjacent to the felled tree(s). Effects to the aerial fuel layer from the described fuel pre-treatment would be limited to less than ¼ acre per pre-treated clump. Created canopy openings would be natural in appearance and would improve snow accumulation within clumps and provide greater growing space for unaffected adjacent trees and understory plants. Fire intensities are increased by the pre-treatment of fuels but nearly all the heat generated would be released upwards in flaming combustion. Consequently there would be little resident burning time and effects to soils would be minimal.

Thin and Pile

This treatment involves cutting of ponderosa pine trees up to 12 inches DBH. Slash may be piled by hand or mechanically. Piles would be burned. This treatment is prescribed for stands that have not received understory thinning and/or burning in the past 20 years. The thin and pile treatment is prescribed for two types of areas, urban interface boundaries and some sensitive non-interface stands. Slash from thinning activities adjacent to private property boundaries would be hand piled. Slash from thinning activities in non-interface areas would be mechanically piled using a bulldozer with a brush rake and some existing logs may be incorporated into dozer piles. Hand and dozer piles would be burned when atmospheric conditions and fine fuel moistures would limit or prevent fire from "creeping" away from individual piles in the surrounding surface fuels. Soils directly below both hand and dozer piles would be severely affected by the long resident burning times. Some crown scorch is likely to occur in trees directly adjacent to piles. Although pile burning would result in high intensity and high severity burning, less than 10% of the thin and pile treatment areas would be affected by high severity fire and the remaining 90% of the surface fuel layer would remain intact and unburned. This treatment would reduce potential visual impacts caused by crown scorch and broadcast slash adjacent to private property and would ensure retention of an adequate number of existing logs and snags in sensitive wildlife habitat that may otherwise be consumed in a prescribed broadcast burn. This treatment alone would not have as great an effect on surface fuels as the treatments involving prescribed broadcast burning but it would result in a minor reduction in surface fuels. The thinning activity involved in this treatment would have the same effects as the thinning described above in Alternative B.

Maintenance Burning of Initial Entry Treatment Areas

Maintenance burning involves broadcast burning 3-12 years after the completion of initial entry treatment activities on all but 271 acres of the Thin and Pile treatment areas. Maintenance burns would generally be low intensity and would have shorter combustion times than the majority of the prescribed burns that would precede them because of the surface fuel reduction achieved by the initial burns. Maintenance burns that occur on the 212 acres of Thin and Pile treatment could be of moderate intensity and/or severity due to the minor surface fuel reduction achieved by the Thin and Pile treatment. The effects of maintenance burning would be the same the prescribed burning effects described in Alternative B but the effects would generally be of lower severity. Maintenance burning would keep surface fuel loading low and control conifer regeneration. Burning on a 3-12 year interval after the initial phase of treatment, also emulates the historic fire regime of the project area. Low intensity burning would encourage herbaceous growth in the understory and would help to improve and/or maintain a high diversity of understory plant species and their associated vertebrates and invertebrates.

Cumulative Effects

Cumulative effects for Alternative C are similar to the cumulative effects described for Alternative B above with respect to the past, present and foreseeable future actions. The maintenance burning in previously treated stands over 8,407 acres would have a greater overall positive cumulative effect for fuels than Alternative B

Vegetation

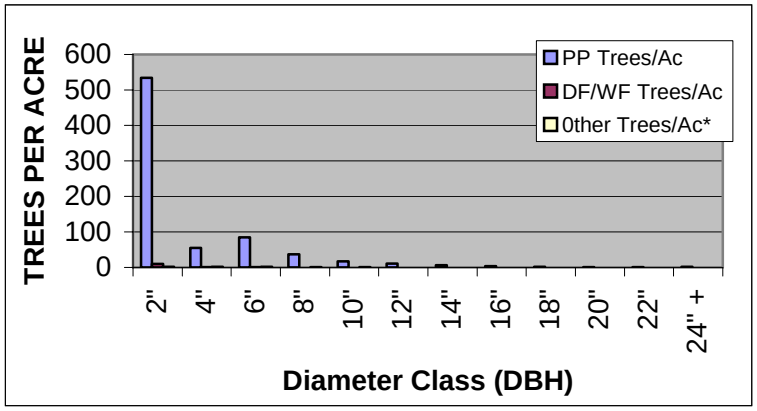
The following section pertaining to the affected environment and effects of the alternatives on vegetation is summarized from the *Vegetation Analysis Report*, by Koyiyumptewa, dated October, 2004 (PR# SR20).

Affected Environment

Habitat Types

The Victorine WUI project area can generally be classified into two habitat types. Drainages and ridge tops from approximately the137B road south toward Forest Road 298 (Victorine South) are classified as ponderosa pine (*Pinus ponderosa)*/Arizona fescue (*Festuca arizonica)* habitat type and are comprised of ponderosa pine with Arizona fescue, mountain muhly *(Muhlenbegia montana)* or screwleaf muhly (*Muhlenbegia virescens)*, (a ponderosa pine overstory with a grass understory). Inclusions of Douglas-fir (*Pseudotsuga menzensii*), white fir (*Abies concolor)*, Southwestern white pine (*Pinus strobiformis)*, Gambel oak (*Quercus gambelii*) and quaking aspen (*Populus tremuloides*) are associated with this habitat type. Figure 3-1 shows conifer stand densities (trees per acre) by diameter class for this habitat type. Corresponding basal areas (BA) in this ponderosa pine habitat type range from about 40 to 210 square feet per acre (ft^2/acre). Trees are often distributed in clumps or groups with intermixed open herbaceous areas between clumps in stands with low basal areas. Stands with high basal areas (greater than 100 ft^2/acre) have very few canopy openings and generally continuous canopy cover. The average basal area per acre is about 80 BA and the quadratic mean diameter (QMD) is 6.3" DBH[9]. QMD is the diameter of a tree of average basal area and is commonly used instead of the mean or average diameter because of its direct relationship with stand basal area.

Figure 3-1: Victorine South Trees Per Acre by Diameter Class.



PP = Ponderosa Pine DF/WF = Douglas-fir/white fir Other Trees = Gamble Oak and Aspen

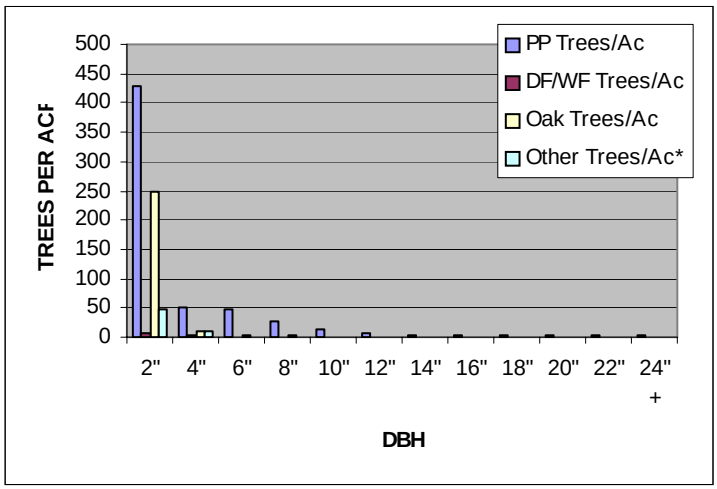
[9] D.B.H. Diameter at breast height, 4 ½ feet above ground.

The northern portion of the project area from the 137B road north to East Clear Creek (Victorine North) is classified as ponderosa pine /blue grama (*Bouteloua gracilis*) habitat type and is comprised of ponderosa pine and blue grama with inclusions of Arizona fescue and screwleaf muhley (a ponderosa pine overstory with a grass understory). Douglas-fir, white fir, Gambel oak, alligator juniper (*Juniperus deppeana*), Rocky Mountain juniper (*Juniperus scopulorum*), are intermixed with the ponderosa pine overstory. Aspen is absent or considered incidental in this habitat type. Figure 3-2 shows the conifer stand densities (trees per acre) by diameter class for this habitat type. Stand densities in this ponderosa pine habitat type range from 20 BA to 115 BA. Trees are often distributed in clumps or groups with intermixed open herbaceous areas between clumps in stands with low basal areas. Stands with high basal areas have very few canopy openings and continuous canopy cover. The average basal area per acre is about 83 BA and the QMD is 7.1" DBH.

In the extreme northern portion of the project area, on ridge tops south of East Clear Creek, Gambel oak, pinyon pine (*Pinus edulis*), Rocky Mountain juniper and alligator juniper are intermixed with sparse ponderosa pine overstory and some shrub species. Drainages and steep canyons on north facing aspects of East Clear Creek can have Douglas-fir and white fir intermixed with ponderosa pine.

The northern portion of the project area includes many more woodland species (oak, juniper, and some locust) than the southern portion. This implies greater potential vertical and horizontal heterogeneity in the overstory in the northern portion relative to the southern portion. The northern portion of the project area also has a lower maximum inventoried basal area and higher QMD relative to the southern portion. This is primarily due to the effects of past understory thinning activities within areas of past overstory removal that reduced stand basal areas and increased stand QMD and growth rates.

Figure 3-2: Victorine North Trees Per Acre by Diameter Class.



Other Trees = juniper and pinyon pine

Vegetative Structural Stage

Vegetation Structural Stage (VSS) is a generalized description of the forest growth and aging stages based on the majority of trees in specific diameter classes within stands. Goshawk management guides utilize six growth and ages stages (Table 3-3) coupled with three canopy cover classes (Table 3-4) to describe stand structure. For example, if the majority of the stems of a stand (based on proportion of total stand basal area) were in the 12-18 inch diameter class and the canopy cover was 45%, the stand would be classified as a VSS4B.

Table 3-3: Vegetative Structural State Diameter Ranges and Descriptions

Stage	DBH Range (inches)	Description
1	0 - 0.9	Grass-forb-shrub
2	1 - 4.9	Seedling-sapling
3	5 - 11.9	Young forest
4	12 - 17.9	Mid-aged forest
5	18 - 23.9	Mature forest
6	24+	Old forest

Table 3-4: Vegetative Structural Stage Canopy Closure Codes, Percentages, and Descriptions.

Code	Canopy Closure (%)	Description
A	0-39	Open
B	40-59	Moderately Closed
C	60+	Closed

The VSS of the Victorine WUI project area is:

Table 3-5: Acres of Vegetative Structural Stage and Canopy Closure within the Victorine WUI.

Canopy Closure (acres)				
VSS	**A (Open)**	**B (Moderately Closed)**	**C (Closed)**	**TOTAL**
1	737	N/A	N/A	737
2	1,387	0	0	1,387
3	2,161	4,336	1,494	7,991
4	1,136	1,715	785	3,636
5	2,376	1,125	216	3,717
6	0	272	61	333
TOTAL	7,797	7,448	2,556	17,801

The current VSS distribution is:

Table 3-6: Current VSS Distribution within the Victorine WUI Project Area.

VSS	1	2	3	4	5	6
Existing %	4	8	45	20	21	2

The desired VSS distribution is:

Table 3-7: Desired VSS Distribution According to Amendment 11 of the Coconino National Forest Land and Resource Management Plan.

VSS	1	2	3	4	5	6
Desired %	10	10	20	20	20	20

Inventory information indicates[10] the VSS 3 tree size classes dominate the project area (Table 3-5). Stands characterized as VSS 3 comprise approximately 45% of the overstory vegetation (Table 3-5), far exceeding the desired amount of 20% described in the Forest Plan (Table 3-7). VSS 4 and VSS 5 are the next most prevalent classes, occupying 20% and 21% of the project area respectively, meeting Forest Plan guidance. VSS 1 and VSS 6 are the least prevalent classes within the project area, having 4%, and 2% coverage respectively. VSS 6 is far underrepresented within the project area with only about 1/10th of the desired amount currently existing. VSS 1 and VSS 2 are both underrepresented as well.

Insects and Disease

Dwarf mistletoes (DM) are the most prevalent disease-causing agents in the Southwestern forests. Growth reduction is their most important effect, although severe infection greatly increases mortality (USDA Forest Service 2002b). Surveys from some of the proposed treatment stands indicate dwarf mistletoe infection ranges from low to high. Dwarf mistletoe tends to be species-specific; meaning the variety of dwarf mistletoe that infects ponderosa pine will not infect Douglas-fir or other tree species. The near-monoculture and density of the ponderosa pine stands both facilitate the spread of dwarf mistletoe in the project area. Dwarf mistletoe manifests itself primarily in small, localized infections of less than one-tenth acre. Based on the 2002 forest insect and disease conditions report, dwarf mistletoe incidence changed little from year to year, but is thought to have increased over the past century (USDA Forest Service 2002b). Based on inventory information, the over all stand dwarf mistletoe rating for both Victorine South and Victorine North is 0.2 (low)[11].

The two most common bark beetles affecting ponderosa pine along the Mogollon Rim in Arizona are the pine engraver beetles, *Ips* species, and the Western pine beetle, *Dendroctonus brevicomis*. Pine engraver beetles are responsible for most of the ponderosa mortality on the Mogollon Rim Ranger District over the last 10 years. Pine engraver beetles prefer to breed in fresh pine debris such as that created during logging and thinning operations or construction operations; however living trees can be attacked, sometimes in great numbers in certain situations. A number of factors are associated with outbreaks of pine engraver beetles in living trees. These include drought, presence of parasites such as dwarf mistletoe, wildfires, and dense stand conditions. Outbreaks of engraver beetles typically occur in areas suffering from many of the aforementioned

[10] Based on 1986 and 1988 Stand Examinations
[11] Based on 1986 and 1988 Stand Examinations

factors simultaneously. Pine engraver beetles typically attack smaller diameter trees or tops of larger trees. Western pine beetle outbreaks are favored by many of the same factors, except that this insect does not breed in pine debris and it prefers larger diameter trees. In general, for both insects, stand densities greater 120 BA are thought to be most susceptible.

Some thinning and chipping operations on the Apache-Sitgreaves and Kaibab National Forests have resulted in infestations of pine engrave beetles in residual trees. It is believed that the beetles were attracted to the terpenes released during the chipping operations. There are no estimates available on the damage from chipping induced bark beetle infestation (Fairweather, 2001 personal communication).

During the analysis phase of this project, tree mortality observed from bark beetle infestations was typically infrequent and localized (10 to 20 trees). Most of the mortality was within previous broadcast burns where trees were stressed from the prescribed burn.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects

Under this alternative there would be little change in the VSS distribution from the existing condition in the short term. In the long term (10 years +), there would be a gradual decrease in VSS 1 as existing openings begin to “fill in” with ponderosa seedlings and saplings. VSS 2 would remain fairly steady as some existing VSS 2 stands would become VSS 3 and some VSS 1 stands would become VSS 2 due to tree growth. VSS 3 would remain at around 45% of the project area due to minor in-growth of VSS2 stands and minor out-growth of VSS 3 stands. Many of the existing VSS 3, VSS 4, and VSS 5 stands would not grow into the next larger VSS class because they are currently at the lower end of their respective diameter ranges and are growing slowly due to high stand densities and drought.

Canopy cover would gradually increase and annual tree diameter growth would decrease due to increasing age and inter-tree competition due to stand density. As canopy cover increases, ponderosa pine litter increases in depth and percent soil cover. Less sunlight and precipitation would reach the forest floor due to canopy interception and the increasing pine litter and duff layer would intercepts more of the moisture that reaches the forest floor. Shading of the forest floor and pine litter accumulation would reduce herbaceous understory growth, and establishment and reduces available soil moisture and nutrients to nearly all plants and soil organisms (Brown et al. 2000, Naumburg et al. 2001). The result would be increased levels of stress on all trees, increased density-induced mortality, and increased crown fire hazard (Brown et al. 2000). Competition for water and nutrients decreases the ability of trees to survive drought, bark beetles, and

other pathogens. Dwarf mistletoe would continue to spread and intensify, affecting growth and longevity of ponderosa pine. The average rate of spread is 1 foot per year.

Susceptibility to western pine beetle would slowly increase over time. Areas with the greatest likelihood of infestation are those stands with densities greater than 120 BA and average stand diameters greater than 12" DBH. Susceptibility to *Ips* spp. would continue to increase with activity most likely occurring in response to a drought or a snow or ice event that creates fresh pine debris. The end result would be an overall decline in forest health and vigor and an increase risk for high intensity fire (Covington et al. 1994)

The effect of a fire occurring in peak fire season would be a high intensity, high severity fire that would likely stand replace most forested stands with low mean diameters (VSS 2 and VSS 3), low ground to live crown heights, and any canopy class. Most other forested stands with moderate to high canopy closure (canopy classes B and C) and/or low ground to live crown base heights would be killed by fire regardless of mean diameter. These areas would become VSS 1. Stands with these conditions occur on over 50% of the project area.

Cumulative Effects

Past Timber Sales and Pre-Commercial Thinning

The consideration of cumulative effects relating to silvicultural activities, includes timber sales and thinning, and uses a record of all silvicultural activities that have occurred in the past 30-35 years. It was during this time period that most of the silvicultural activities that produced significant changes from historic forest stand structure occurred. See Table 3-1 for a description of these harvest activities. The harvest regime initiated in the early 1970s focused on the aggressive removal of the larger mature tree component, regardless of vigor. Generally, many of the trees greater than 12" DBH were removed and the residual stand was thinned to densities greater than 150 trees per acre. The residual stands consisted predominately of heavily stocked, young to mid-aged trees. This type of harvest caused considerable changes in stand structure and a short-term change in stand stocking. The residual stands most commonly average 80 years of age. The trees in these stands have not achieved a high individual growth rate and the development of mature and old tree structural stages has not been enhanced. These harvests generally did not remove enough of the density to reduce the stand below a significant risk threshold; these stands are still at risk of stand replacement wildfire and stress related insect and mortality losses.

Vegetation treatments within the last 18 years within the Victorine project area or adjacent to it, have followed management direction in the Coconino Forest Plan. To some degree, all treated areas are progressing towards the future forest conditions described in the Forest Plan. See Tables 3-1 and 3-2 for a description of these past, ongoing and future foreseeable vegetation management activities.

Past timber sales in the 1990s, (Buckhorn, Leonard, and Limestone) were predominantly partial overstory removals, harvesting 12"+ DBH trees. These harvests resulted in changing habitat to single story and single age stands of ponderosa pine. Thus, VSS 3 tree

size classes dominate the project area, and very few stands have trees greater than 24" DBH.

Past pre-commercial thinning in the Victorine project area were conducted to reduce stocking (tree densities) and control the spread of dwarf mistletoe infection. About 700 acres have received pre-commercial thinning as part of the Buckhorn and Limestone timber sales, to either a 10' X 10' or a 12' X 12' spacing between residual tree stems. Ponderosa pine trees 2 feet tall or greater up to 5" DBH were removed. This had a beneficial affect of reducing stocking and controlling the spread of dwarf mistletoe infection. Past thinning also reduced the existing crown fire hazard in the affected stands relative to what it would have been if the stands were left un-thinned. These treatments did reduce fire hazard for a short time but, because of their low treatment intensity, their effect on fire hazard reduction is expiring due to surface fuel accumulation (litter fall), and canopy growth.

Future Thinning and Fuel Reduction Projects

The proposed East Clear Creek Watershed Health Improvement Project (ECC) would thin trees less than 12" DBH on 9,600 acres and conduct prescribed burn 22,600 acres including the thinned acres. A thin from below prescription would be implemented. This proposed project is south and west of the Victorine project area within the Upper Clear Creek 5th code watershed. Only a small part of the ECC project overlaps with the Victorine project area: 16 acres of ponderosa pine up to 16" DBH would be thinned in the Limestone Spring area to increase water yield; and 100 acres of thinning along the 137 road. Another 200 acres of thinning in the Victorine project area would be implemented by the Buck Springs Range Analysis and Allotment Management Plan, a ongoing project. All of these thinning treatments would reduce stocking densities and prescribed burning would reduce surface fuels. An indirect result would be a reduction in ladder fuels, reducing high intensity fire risk up wind of the Victorine project area.

Other Vegetation Species Diversity Enhancement Projects

No vegetation species diversity enhancement projects are planned beyond the four current ongoing aspen enhancement projects. In the long-term, (ten years +), as stand densities increase over time and space, there would be an increased risk for high intensity fire. If a high intensity wildfire occurs in the project area, the investments made in the vegetation species diversity enhancement projects would be lost.

If this alternative is selected and implemented, the primary purpose and need for action, reduction of crown fire hazard in the Victorine WUI would not be met.

Alternative B: Proposed Action

Direct and Indirect Effects

Maintenance Thin and Burn on 890 previously treated acres

Under Alternative B, approximately 890 acres would be thinned from below on previously treated acres. The thin from below treatment would remove trees greater than 2 ½ feet tall up to 12" DBH but the majority of trees removed would be in the <1" - 9" DBH range because that diameter range holds the largest number of trees within the project area (Figures 3-1 & 3-2) and within the affected stands. The treatment would target trees with small crowns that are suppressed, have poor form, have poor health and vigor, or those affected by various pathogens plus any excess stocking. Ponderosa pine trees of all sizes would be included in determining spacing between desired leave trees. Ponderosa pine greater than 12" DBH, Gambel oak, aspen, and juniper trees would not be cut. Targeting of small diameter trees for removal would raise the ground to live crown height of the residual stand. The end result would be a reduction in ladder fuels. Residual pine basal areas would be in the range of 30 - 60 square feet per acre. Spacing guides may be used for thinning prescriptions but clumping or grouping of residual trees would also be applied. Clumping trees maintains wind firmness and provides for future interlocking canopies. Clumping of residual trees also creates irregularly sized and shaped canopy gaps and provides growing space for herbaceous plants, both of which contribute to within stand heterogeneity and diversity. Clumping should not be used if it would compromise the crown fire reduction objective of this project.

Thinning from below reduces competition for soil moisture, soil nutrients and sunlight. Reduction of competition increases growth rate, vigor and health of the residual trees. Thinning would result in growth of large trees faster than if the stands were left untreated. Post-treatment conditions would concentrate the growth and available water and nutrients on the residual larger trees rather than sharing these resources with the existing dense thickets of small diameter trees. This would improve the overall health and vigor of these larger trees and would reduce their susceptibility to insects and diseases.

The created thinning slash would be broadcast on site and burned with a low/moderate intensity prescribed burn to remove needles, small twigs and branches within 5 years of the thinning. Waiting for up to 5 years allows time for the fine fuels to fall from the slash and allows winter snow loads to compact the slash, reducing potential flame lengths. A direct effect of slash burning would be consumption of slash and forest litter. In addition, live fuel loading would also be reduced by scorching lower branches of residual trees and by killing some smaller regeneration. Crown scorch and regeneration mortality would effectively increase ground to live crown heights. The low/moderate intensity prescribed burn would help reduce crown fire risk in the project area. As the thinning slash burns or decomposes, the nutrients that were formally tied up in the living biomass would become available for residual trees. This would help improve the over health and vigor of the residual trees and would reduce their susceptibility to insects and diseases.

Areas of moderate intensity prescribed burning are expected to reduce the amount of dwarf mistletoe infection in individual trees and cause some tree mortality. Dwarf mistletoe infected trees suffer more crown scorch than healthy trees because they have flammable witches brooms and lower crowns (Alexander and Hawksworth 1975). Moreover, given equal amounts of crown scorch (within the 38% to 87% range), heavily infected trees have less than half the probability of survival than uninfected trees.

Mortality of mistletoe-infected trees, particularly those greater than 12 inches DBH, would result in snag recruitment and eventually log recruitment.

Maintenance Burn: 911 previously treated acres

This treatment of 911 previously treated acres involves low intensity prescribed burning on previously thinned and/or burned areas. The low intensity prescribed burn would remove forest litter comprised of needles, small twigs and branches and some logs. A direct effect would be a reduction in dead-down fuel loading. The low intensity prescribed burn would help maintain the existing low to moderate crown fire hazard within the affected stands.

Low intensity prescribed burning releases nutrients that are tied up in forest floor material making some of them available to plants and soil organisms for a few years. Increased nutrient availability improves the health and vigor of the residual trees and herbaceous plants.

The low intensity prescribed burning is not expected to reduce the amount of dwarf mistletoe infection in individual trees nor result in mortality of those trees because of shorter flame lengths (Alexander and Hawksworth 1975).

Broadcast Burn: 4,915 previously untreated acres

The broadcast burn treatment involves a low to moderate intensity prescribed burn with flame lengths averaging less than 4 feet on about 4,915 previously untreated acres. This low to moderate intensity burn may result in up to 10 percent conifer mortality. Broadcast burning can increase the vigor of plants through release of nutrients. This effect is short-term and is affected by the burn intensity. In general, the greater the burn intensity, the greater the nutrients would be volatized, and there would be less available for plants after burning because of loss as smoke. Very low intensity burns in pine litter may have a negligible effect on nutrient availability due to very minor consumption of fuels. Prescribed burns ranging from low to moderate intensity/severity, that consume the litter layer and partially to completely consume the duff layer of pine litter fuel beds without severely affecting soils provide the greatest effect in terms of nutrient cycling and herbaceous response (Brown et al. 2000). This treatment proposes low to moderate intensity broadcast burning. High intensity burns and/or repeated burning can move the succession of the site back towards an earlier successional stage, which could change the species composition, primarily in the understory.

Broadcast burning would help thin out the understory by killing seedlings and small saplings and scorching or consuming foliage on branches less than 10 feet above the ground, reducing ladder fuels. However, this method to reduce stocking densities is not wholly predictable. Prescribed broadcast burning can result in mortality of some desirable trees of all species and all sizes or result in less mortality of seedlings and saplings than desired depending upon weather and fuel conditions over the course of the burn.

Broadcast burning should increase ground cover plants, i.e. grasses, forbs and shrubs. Gambel oak, buckbrush (*Ceanothus fendleri*), grass, and forb regeneration should increase

because of the low/moderate intensity burning. This would enhance species diversity and richness in the project area. There is a potential to increase the number of ponderosa seedlings that, over time, would contribute to diversity in stand structure because of the increased availability of mineral soil seedbeds. A negative effect of burning may be the risk of mortality to desirable ground vegetation, however most native (desirable) ground vegetation is fire resilient and should fully recover within 3-5 years.

Broadcast burning can also affect noxious weed distribution. High intensity burns can increase the amount of heavily disturbed soils, which would provide the medium for a potential increase in noxious weeds. The low/moderate intensity broadcast burning could reduce the risk of noxious weed invasion and/or spread.

Broadcast burning would create openings in the overstory canopy. In the long-term (10 years or more), an indirect effect would be an increase in the VSS 2 (seedling and sapling) as openings greater than half an acre "fill in" with pine regeneration. An indirect result would be an increase in ladder fuels that would increase the risk of a high intensity fire if no other activities were undertaken to control regeneration.

Burn/Thin/Burn: 782 previously untreated acres

In this alternative, 782 acres would be broadcast burned first to reduce existing high dead/down fuel loading followed by a thin from below. The thin from below treatment would remove trees greater than 2 ½ feet tall up to 12" DBH but the majority of trees removed would be in the <1" - 9" DBH range because that diameter range holds the largest number of trees within the project area (Figures 3-1 & 3-2) and within the affected stands. The treatment would target trees with small crowns that are suppressed, have poor form, poor health and poor vigor, or those affected by various pathogens plus any other excess stocking. Ponderosa pine greater then 12" DBH, Gambel oak, aspen, and juniper trees would not be cut. Targeting of small diameter trees for removal would raise the ground to live crown height of the residual stand. The end result would be a reduction in ladder fuels. Residual pine basal areas would be no less than 30 BA and would generally range from 30 - 60 square feet per acre.

Spacing guides may be used for thinning prescriptions with ponderosa pine trees of all sizes included in determining spacing between desired leave trees. For example, if a stand were to have a projected residual average diameter of 12 inches, spacing of approximately 24 feet between trees would be required to reduce the BA to 60 feet^2/acre. Clumping or grouping of residual trees is therefore highly encouraged and is preferred over even spacing where applicable. The effects of leaving residual clumps of trees were described in the *Maintenance Thin and Burn* section above. Clumps should be thinned from below to raise ground to live crown base heights and clumps should be separated by a minimum of 50 feet between crowns. Thinning would minimize the potential development of crown fire within individual clumps and the minimum spacing between clumps would minimize the potential for continuous crown fire spread in the event of crown fire development. A direct result would be a reduction in ladder fuels; therefore, a reduction of crown fire risk to the urban interface and private lands in the project area.

The thinning from below prescription would have the same effects as previously described in the *Maintenance Thin and Burn* section above.

Dwarf mistletoe spreads by explosively released seeds, which are expelled to distances typically ranging from 10 to 40 feet. Spread is most efficient and rapid from an infected overstory to an understory. In infection centers, the proposed thin from below treatments would reduce infection by removing the more heavily infected understory trees while increasing the distance between residual tree crowns, minimizing the potential for spread.

In this alternative susceptibility to western pine beetle would be reduced in those areas where densities are reduced to less than 120 BA, preferably well below 120 ft^2 in order to allow for growth, vigor and health of the ponderosa pine trees. While long-term susceptibility to bark beetles would be reduced in those areas treated as described above, risk of an *Ips* spp. outbreak in living trees would increase temporarily during treatment when fresh pine slash is available for colonization. Risk would be highest in years when precipitation is 75 percent or less of average. Burning of created thinning slash soon after the slash cures would help reduce the risk. As conditions warrant, or if monitoring indicates a need, thinning would be scheduled between July and December, and creation of slash would be minimized between January and June. Monitoring of green slash for insect infestation would be conducted throughout the project. If a serious infestation develops it would be treated. Implementing the mitigation would reduce the risk substantially (USDA Forest Service 1999)

The created thinning slash would be broadcast on site and burned with a low/moderate intensity prescribed burn to remove needles, small twigs and branches within 5 years of the thinning. The effects are the same as those for the *Maintenance Thin and Burn* treatment previously described.

The effects of moderate intensity prescribed burning on trees affected by dwarf mistletoe infection are also the same as described in the *Maintenance Thin and Burn* section above.

Thin and Chip slash: 10 acres

This is a thin from below treatment applied immediately adjacent to developed private land to reduce high intensity fire risk while minimizing visual impacts of thinning slash. The thin from below treatments would be the same as described above followed by chipping of thinning slash rather than lopping or burning. Chips are broadcast on site. The chipping activity would be monitored for bark beetle activity following completion. If a serious infestation develops it can be treated to reduce the risk of *Ips* spp. infestation to developed private lands.

Effects to Vegetative Structural Stage

The thinning in the short term (10 years) and in the long term (10+ years) would have a direct beneficial effect of moving the existing VSS classes (VSS 3, 4, and 5) into the next larger classes. In the short term, the thinning would have a direct effect of reducing tree densities in the VSS 2 as small diameter trees are targeted for removal. In the long term,

the thinning would have an indirect effect on the VSS 1, as tree densities are reduced, there would a gradual increase in the VSS 1 class (grasses, forbs and shrubs). The overall impact would be an increase in the VSS 6 and VSS 1 to help meet the desired VSS distribution (Table 3-7), but there would also be a decrease in the VSS 2 that would not meet the desired VSS distribution (Table 3-7).

The low to moderate intensity prescribed burning and broadcast burning in the short term would have a direct effect of reducing the VSS 1 and VSS 2 and would have no or little impact on the VSS 3, 4, 5 and 6. There would be minor bole and crown scorching in small, localized areas where the moderate intensity burns crown out. In the long term, there would be a gradual increase in the VSS 1 and VSS 2 but minor changes in the VSS 3, 4, 5, and 6.

Cumulative Effects

The duration for cumulative effects for the action alternatives is about 10 years after treatment for this resource, as the effects of understory burning and thinning last about 8-10 years, with maintenance burning maintaining those effects. The area of consideration is the Victorine project area, unless otherwise stated.

The existing conditions which make up the present baseline are the same as described in the Alternative A *Cumulative Effects* section. Vegetation treatments in the recent past within the Victorine project area or adjacent to it have followed direction in the Coconino Forest Plan since 1987. To some degree, all treated areas are progressing towards the future forest conditions described in the Forest Plan. Ongoing and future thinning and fuel treatment actions in the project area would also be a positive cumulative effect. The Alternative B treatments also progress towards Forest Plan goals, and therefore have a positive cumulative effect and are trending towards the desired the forest structure for the region. If Alternative B is selected and implemented, the primary purpose and need for action and the sole resource objective of reducing high intensity wildfire risk in the Victorine WUI project area would be met.

Alternative C: Modified Proposed Action

Direct and Indirect Effects

Maintenance Thin and Burn: 805 previously treated acres

The discussion of effects in the proposed maintenance thin and burn treatment in Alternative B is the same for Alternative C. Alternative C proposes 85 fewer acres of treatment than Alternative B.

Maintenance Burn: 839 previously treated acres

The discussion of effects in the proposed maintenance burn treatment in Alternative B is the same for Alternative C. Alternative C proposes 72 fewer acres of treatment than Alternative B.

Broadcast Burn: 6,083 previously untreated acres

The discussion of effects in the proposed broadcast burning treatment in Alternative B is the basically the same for Alternative C with one exception described below. Under this Alternative, 1,168 more acres are proposed for a broadcast burn treatment than in Alternative B. The broadcast burn treatment in Alternative C also includes pretreatment of fuels as part of the prescribed fire site preparation. Pretreatment of fuels, in this case, involves the selective felling of ponderosa pine trees less than 9" DBH from within groups or clumps that are selected to receive fuel preparation. Felled trees are left in tact and in place to create fuel ladders, resulting in isolated occurrences of crown fuel consumption and/or high crown scorch within its immediate vicinity. The selection criteria require that clumps would be selected within 1/3 mile of homes and that clumps would not include a substantial number of trees greater than 12 inches DBH. Under Alternative B, no pretreatment of fuels is proposed. The effects of this treatment are to create small openings in the canopy. The anticipated effects and conditions after fuel pretreatment are described in the Fire and Fuels effects analysis for Alternative C in this chapter, and the "*Fire, Fuels and Air Quality Report for Victorine WUI*" by Jerman dated October 19, 2004 (PR# SR5).

Burn/Thin/Burn: 468 previously untreated acres

The discussion of effects in the proposed burn/thin/burn treatment in Alternative B is the same for Alternative C. Alternative C proposes 314 fewer acres of the burn/thin/burn treatment than Alternative B.

Thin and Pile: 483 acres

Trees would be thinned and slash piled and burned in areas immediately adjacent to developed private land, in or adjacent to sensitive wildlife habitat, and in areas with very high existing surface fuel loading. These treatments would be used to improve control of fire effects to residual stand structure adjacent to private land and within sensitive habitat. The thin from below treatment prescription is the same as in Alternative B, *Burn/Thin/Burn*, and would have similar effects.

Piling of slash would be done immediately after the thinning operation, reducing the threat of crown fire or high severity surface fire due to slash and reducing the risk of pine engraver beetle attacks. Piles would be constructed by hand or by mechanized equipment. Piles would be burned after the slash cures.

A direct effect from the thin from below, machine piling and burning treatments is a reduction in ladder and surface fuel loading. The end result is a reduction in the risk of a high intensity fire.

Maintenance Burning: 7,739 acres

Maintenance burning would be applied within 3 to 12 years of completion of individual treatments. The maintenance burning treatment uses prescribed broadcast burning to mimic the historic fire regime in fire frequency, severity and intensity.

The maintenance burn treatment involves a low to moderate intensity prescribed broadcast burn with flame lengths averaging less than 4 feet. Maintenance burning would have the same effects as the previously described broadcast burn effects but should have a lower potential for overstory mortality due to previous reductions of surface fuels from the initial entry treatments. This treatment would help to maintain and in some instances enhance the effects of the initial entry treatments by consuming fuels generated by fire induced mortality from the initial entry treatments.

The short and long term effects on vegetative structural stage would be the same as in Alternative B.

Cumulative Effects

The cumulative effects described in Alternative B are the same for Alternative C because the differences in treatments between the two alternatives are very minor and the past, ongoing and foreseeable future actions are exactly the same. If Alternative C is selected and implemented, the primary purpose and need for action and the sole resource objective of reducing crown fire hazard in the Victorine WUI project area would be met. This modified proposed action alternative best meets the purpose and need for action and the resource objective because more acres are treated across the landscape.

Soil

The following section pertaining to the affected environment and effects of the alternatives on the soil resource is summarized from the *Soil and Water Specialist's Report,* by Fleishman, dated June, 2005 (PR# SR18).

Affected Environment

Climate
The climate of the project area is classified as "low sun cold" climate class. The majority of the precipitation falls from October 1 to March 31, mainly in the form of snow. Thus the winters are cold and soil temperatures are classified as frigid and subject to freezing and thawing. Summer precipitation is spotty, but usually takes place in the form of high-intensity, short duration thunderstorms during the monsoon season (July through September). Precipitation on the average varies from 18 to 26 inches annually in the ponderosa pine cover type, and from 26 to 30 inches in the mixed conifer cover types.

Landform
A variety of landforms occur within the project area. The primary landform is elevated plains. The average slope of the elevated plains is less than 15%, and occurs on all aspects. Other landforms in the project area include hills and scarp slopes of plains. These have average slopes of 15-40% occurring on all aspects. Escarpments have slopes that exceed 40% slope (Table 3-8).

Table 3-8: Landforms of the Victorine WUI Project Area

Elevated Plains	11,501
Hills/Scarp Slopes Of Plains	5,070
Escarpments	3,344
Total Acres	**19,915**

The Terrestrial Ecosystem Survey (TES) for the forest (USDA Forest Service, 1995) defines erosion hazard based on bare ground (complete removal of vegetation and litter). A rating of "slight" indicates that all vegetative ground cover could be removed from the site and the resulting soil loss would not exceed "tolerance" soil loss rates. A rating of "moderate" indicates that predicted rates of soil loss would result in a reduction of site productivity *if left unchecked*. Conditions in moderate erosion hazard sites are such that reasonable and economically feasible mitigation measures can be applied to reduce or

eliminate soil loss. A rating of "severe" indicates that predicted rates of soil loss have a high probability of reducing site productivity before mitigating measures can be applied.

Table 3-9: Soil Data within the Victorine Urban Interface project area.

TES Map Unit	Plant Association	Acres	Slope,%	Erosion Hazard
455	Pinyon- Juniper	661	40-120	Severe
500	Pinyon- Juniper	79	0-15	Slight
527	Ponderosa Pine	67	15-40	Moderate
546	Ponderosa Pine	6,450	0-15	Slight
549	Ponderosa Pine	2,032	15-40	Moderate
550	Ponderosa Pine	3,154	15-40	Moderate
555	Ponderosa Pine	2,803	40-120	Severe
567	Ponderosa Pine	4,526	0-15	Slight
652	Mixed Conifer	143	15-40	Slight
Total		**19,915**		

Soil Condition of the Victorine Project Area

The following is a brief discussion of existing soil conditions within the Victorine project area. A soil condition category is assigned to each ecological unit (Table 3-10). Under this broad scale level of analysis (coarse filter analysis approach), it is important to note that soil conditions within a given ecological unit may vary widely.

Mixed Conifer Forest Life Zone

This life zone consists of ecological unit 652. Soil condition is generally satisfactory. Soils are functioning normally and properly due to adequate vegetative ground cover provided by needle casts, oak leaves, woody debris and perennial vegetation such as grasses, forbs, and shrubs. Organic matter is distributed evenly across the soil surface, promoting satisfactory soil aggregation. The surface A horizon is present and is well distributed and is not fragmented. Satisfactory soil condition indicates that the inherent productivity capacity of the soil resource is being sustained with respect to all soil functions. Total acres of satisfactory soil condition within the mixed conifer life zone are about 142.

Ponderosa Pine Forest Life Zone

This life zone consists of ecological units 527, 546, 549, 550, 555, and 567. Soil condition is generally satisfactory within these ecological units. Soils are functioning normally and properly, organic matter is distributed evenly, and the A horizon is normal. The inherent productivity capacity of the soil resource is being sustained with respect to all soil functions. Total acres of satisfactory soil condition within the ponderosa pine life zone are about 16,228 acres.

Pockets of ecological unit 546 are identified as being impaired, signifying a reduction of soil quality. As a result of past timber harvesting activities, these ecological units have been subjected to intensive machine piling, skid trails, landings and burning activities which have resulted in localized areas of soil displacement and extensive areas in which significant amounts of coarse woody debris (CWD) have been removed. Organic matter

is generally present, but it is not distributed evenly across the landscape. The surface A horizon is present, but it is not evenly distributed. It varies in thickness due to displacement of soil material as a result of management activities associated with machine piling. In areas of severe soil displacement, perennial grasses and forbs may be sparse. Surface soil structure and aggregation is less pronounced than in undisturbed areas, signifying a reduction in soil quality. The impaired acres are not mappable within this unit but it is thought to occur on approximately 5-10% of the land unit (about 320 – 645 acres). Within approximately 10 years of thinning, the course woody debris component would meet at least minimum CWD requirements due to breakage from weather events and natural mortality. The road system within this life zone displays unsatisfactory soil conditions.

Pinyon-Juniper/Ponderosa Pine Transition Life Zone

This life zone consists of ecological units 455 and 500. Soil condition is generally satisfactory within ecological unit 500 (78 acres). Soils are functioning normally and properly, and organic matter is well distributed. The surface A horizon is present and is well distributed and is not fragmented. Soil condition within ecological unit 455 is unsuited (661 acres) due to the predominance of escarpments within this unit.

Table 3-10: Approximate Acres Categorized by Soil Condition by Terrestrial Ecosystem Survey Mapping Units.

MAP UNIT	TOTAL ACRES	SATISFACTORY	IMPAIRED	UNSATISFACTORY**	UNSUITED
455	661	0	0	0	661
500	78	78	0	0	0
527	66	66	0	0	0
546	6,450	5,805	645*	0	0
549	2,032	2,032	0	0	0
550	3,154	3,154	0	0	0
555	2,803	2,803	0	0	0
567	4,526	4,526	0	0	0
652	142	142	0	0	0
TOTALS	19,912	19,251	645	0	661

*maximum amount of impaired acres in this map unit
** the area of road system is not included in this category.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects -- Soils

Direct effects to soil would be an increase in course woody debris, through natural processes as small diameter material rots and falls to the ground. Direct effects of the no

action alternative are that there would be no thinning activities, therefore there would be no acres of ground disturbance from mechanized logging.

Indirect effects from Alternative A, would be an increase in CWD to very high tons per acre in both live and dead fuel loads. The risk of a stand replacing, high intensity fire would increase over time, which would have a negative affect to soils directly after a stand-replacing, high intensity fire.

Cumulative Effects

Cumulative effects for the proposed Victorine Urban Interface project to soils would include past, ongoing and future foreseeable actions such as timber sales and thinning that can effect the distribution of CWD, primarily through fuel treatments. The geographic setting for the cumulative effects analysis includes the Upper Clear Creek 5th code watershed (formerly known as East Clear Creek 5th code). The timeframe for past actions is 10 years. Refer to Tables 3-1 and 3-2 at the beginning of this chapter for a list of actions considered in the cumulative effects analysis for this resource.

Alternative A would not change the CWD distribution within the Upper Clear Creek watershed; therefore, there would be no direct cumulative effect from this alternative. Over time an indirect cumulative effect of no action would be an increase in CWD, increasing fire hazard; this would be a negative cumulative effect.

Alternative B: Proposed Action

Direct and Indirect Effects

Alternative B would provide short-term benefit from thinning small diameter trees on about 1,682 acres. None of the proposed treatment acres occur on soils with a severe erosion rating. The direct benefit would be that slash would be placed on the ground on these acres, providing a microclimate and protecting the soils, as well as providing for more than adequate course-woody debris on-site. There would be limited ground disturbance associated with this activity because the thinning would be performed by chainsaw. It was assumed that mechanized harvesting equipment would not be used. Ground disturbance can occur from vehicles driving off road, however, this would be very limited in extent and for the purposes of this analysis it is estimated that no more than 5 acres of ground would be disturbed in this manner. The ground disturbance would be in the form of compaction, and not disturbance to where mineral soil is exposed. Thinning would have a short-term and long-term beneficial indirect affect to soil and water resources by decreasing the risk of a high-intensity wildfire. A small amount of ground disturbance (skidded to mineral soil) may occur on the 10 acre thin and chip site as some skidding of material to the chipper by 4-wheel all terrain vehicles may occur. This is expected to occur on approximately 10-15% of the treatment area, equivalent to 1-2 acres of ground disturbance.

Prescribed burning would occur on 7,498 acres under Alternative B. Prescribed burning can effect soil resources through reduction of course woody debris, damage to soil physical structure, and damage to soil biological features (Wells et al. 1979 and Graham et al. 1994), as well as providing positive effects through nutrient flushes from the burn (Covington and DeBano 1990). This increase is short-lived due to rapid biological and chemical immobilization of released nutrients (DeBano and Klopatek 1987). The effects from fire are directly related to fire intensity, with the general rule of thumb that the greater the burn intensity, the greater the amount of damage to forest soils (Wells et al. 1979).

This same general relationship would apply on the Victorine WUI prescribed burn activities. The effect would vary by soil and fuel moisture regimes and fuels distribution however, duff/litter portions of the prescribed burn would have the least negative affect on soil properties, while allowing for release of nutrients for a one to two year period. Burning of larger material would increase the risk to soil properties as the size of material burned increases, which increases fire intensity.

We can expect that a majority of the prescribed burning from the first burn entry (approximately 6,610 acres) would consume the duff/litter portion, and should actually have a positive effect by increasing soil nutrients. A smaller percentage of the burned area would consume the moderate sized woody material, and would have a negative effect to soil biotic material from higher soil temperature; however, soil temperatures are not expected to be high enough to do damage to soil physical structure. This should occur on approximately 1-5% of the treated sites (approximately 65 to 330 acres). The larger sized woody material (10”+ size material) would have the greatest affect to soil properties, similar to the pile burning affects. This should occur on approximately 0-1% of the site (approximately 0-65 acres), (Table 3-11).

There would be a second prescribed burning treatment on acres that have been thinned (1,672 acres). Much of the material that would be consumed would be of medium size (3-10" size material). This is expected to produce varying intensity of burns, with a majority of the burned area in a low to moderate burn intensity. The effects here would vary, depending on the amount of low to moderate burn percentage across the treatment areas. A small percentage of the area (0-1%, or approximately 0-17 acres) is expected to have a high intensity burn due to fuel arrangements after the thinning. With the implementation of BMPs SW2, SW3, and SW7, the effects to soil resources would not be significant and minimal for Alternative B. Since there would be a time lag of from one to three years between initial and second prescribed burning, the effects are not considered as additive but separate direct effects.

Table 3-11: Summary of Direct Soil Effects for Alternative B, Victorine WUI project.

Alternative B Actions		Measure		
	Treatment Acres	**Estimated Acres of High Intensity Burns**	% Treated Acres	% Project Area (19,915 acres)
Initial Prescribed Burning	6,610	0-330	< 5%	<2%
Second Prescribed Burning	1,672	0-17	1%	<0.1%
Alternative B Actions		**Measure**		
	Treatment Acres	**Estimated Acres of Soil Disturbance**	% Treated Acres	% Project Area (19,915 acres)
Thinning & Chipping	1,692	6-8	< 0.5%	0.03 - 0.04%

Cumulative Effects

The cumulative effects analysis for soils for the action alternatives considers the same projects, scale and time frame as described in Alternative A. Refer also to Tables 3-1 and 3-2 for descriptions of the past, ongoing and reasonably foreseeable actions.

Upper Clear Creek

The past and ongoing timber sales and thinning projects within the Upper Clear Creek watershed (203,000 acres) considered in this analysis include the Barber, Gentry, Grama, Hospital, Leonard, Limestone, Lockwood, Merrit U-Bar and Wiggins timber sales, and the Blue Ridge Urban Interface Project, a thinning and fuel reduction project. Treatments from all projects total about 29,756 acres.

Considering all of the past projects, a majority of the projects were machine piled; therefore, we would assume 50% of the area received ground disturbance. The skidding and hauling of timber disturbed approximately 15-20% of the sale area, however, the machine piling areas are the same acres. Therefore, the analysis considers the machine pile disturbance only. Past actions have disturbed approximately 14,870 acres. Each of the past projects were implemented with BMPs, and therefore the effect of the 14,870 acres on sediment production and course woody debris accumulation have been mitigated. With this alternative, there would be an additional 6-8 acres of ground disturbance from thinning, and an estimated 0-347 acres of high intensity burns from the initial and second prescribed burning. The total disturbance is estimated to range from 6 to 355 acres.

Other ongoing, and reasonably foreseeable projects considered in this analysis are described in Table 3-2. The effects and degree of disturbance of these projects on the soil resource is summarized in Table 3-12 below.

Table 3-12: Ongoing and Reasonably Forseeable Actions Considered for the Soil Resource in Upper Clear Creek Watershed

Project and Implementation Start Year	Project Description and Disturbance Estimate
Rim Christmas Tree Cutting, Annually	200 acres of trees less than 10' cut. Not mechanized, ground disturbance no greater than 5% (~10 acres).
Pack Rat Fire Salvage, 2004	A maximum of 550 acres of hazard tree removal, ground disturbance no greater than 20% (110 acres)
East Clear Creek Watershed Health Improvement Project, 2005	~ 22,600 acres prescribed fire, ~ 1013 pre-commercial thinning, and ~ 670 ac. of commercial thinning. Thinning on some of the same acres as Limestone, Merritt, Leonard, Lockwood and Hospital TSs. Most thinning is non-mechanized. Expected ground disturbance and high intensity fire approximately 7% (1580 ac).
Clear Creek Timber Sale, 2005 (Part of ECC Project above)	~ 2,000 acres of thinning up to 18" DBH and fuel treatment. Ground disturbance estimated <25% (500 acres).
Buck Springs Range Analysis and AMP, 2005	~ 200 acres of pre-commercial thinning, non-mechanized. Minimal ground disturbance, 1% (2 acres).
Maple Draw Restoration Project, 2003-2005	~34 acres of thinning, (non-mechanized), and prescribed fire. Minimal ground disturbance, 1% (0.3 acres).

These ongoing and reasonably foreseeable projects are primarily pre-commercial thinning projects that have lop and scatter fuel treatments proposed, as well as prescribed burns. Combined together, these projects are expected to disturb an additional 2,200 acres from ground disturbance and/or high intensity burn impacts. Table 3-13 displays a summary of cumulative impacts measured in terms of ground disturbance estimated from past, ongoing, and reasonable foreseeable projects within the Upper Clear Creek watershed.

Table 3-13: Cumulative Effects Summary of Ground Disturbing Impacts Considering Past, Ongoing and Future Actions in Upper Clear Creek Watershed (203,000 acres) with Alternative B.

Acres Disturbed in Alt. B	Past Disturbance (acres)	Ongoing & Future Disturbance (acres)	Total Disturbance (acres)	% Of Watershed
6-355	14,870	2,200	17,076-17,425	8.4 - 8.6%

Overall, Alternative B in combination with the past, ongoing and future projects, disturbs approximately less than 9% of the Upper Clear Creek watershed. The past use of BMPs has been effective in mitigating the impacts of bare soil from ground disturbance during past management actions and it is believed that the effects from this Alternative would not be significant and minimal to soil resources within the watershed.

Alternative C: Modified Proposed Action

Direct and Indirect Effects

Alternative C would provide short-term benefit from thinning small diameter trees on approximately 1,756 acres. The effects of Alternative C are similar to Alternative B. None of the proposed treatment acres occur on soils with severe erosion rating. The

direct benefit would be that slash would be placed on the ground on these acres, providing a microclimate and protecting the soils, as well as providing for more than adequate course-woody debris on-site. There would be limited ground disturbance associated with this activity because the thinning would be performed by chainsaw. It was assumed that mechanized harvesting equipment would not be used. Ground disturbance can occur from vehicles driving off road, however, this would be very limited in extent and for the purposes of this analysis I would estimate that no more than 5 acres of ground would be disturbed in this manner. The ground disturbance would be in the form of compaction, and not disturbance to where mineral soil is exposed. Pre-commercial thinning would have a short-term and long-term beneficial indirect affect to soil and water resources by decreasing the risk of a high-intensity wildfire. Ground disturbance (skidded to mineral soil) is expected to occur on the approximately 30-50% of the machine piled acres (approximately 140-240 acres of the proposed 483 acres of thinning after burning) of thin and pile acres.

Prescribed burning would occur on about 8,195 acres intially as as maintenance or broadcast burns, or after thinning. There would be a second prescribed burning on 468 acres after thinning and 483 acres after piling. Some years after treatments are completed, 8,407 acres of the project area would be maintenance burned. The same effects occur in Alternative C as in Alternative B, with the general rule of thumb that the greater the fire intensity, the greater the damage to forest soils.

We can expect that a majority of the prescribed burn area on the first burn entry (approximately 8,195 acres) would consume the duff/litter portion, and should actually have a positive effect from increases in soil nutrients. A smaller percentage of the burned area would consume the moderate sized material (primarily created thinning slash on approximately 80 acres), and would have a negative effect to soil biotic material through higher soil temperature; however, soil temperatures are not expected to be high enough to do damage to soil physical sturcture. This should occur on approximately 1-5% of the treated sites (approximately 80 to 410 acres). The larger sized material (10”+ size material) would have the greatest affect to soil properties, similar to the pile burning effects. This should occur on approximately 0-1% of the site (approximately 0-80 acres).

There would be a second stage of the burn on acres that have been thinned (468 acres). Much of the material consumed in the second stage of the burn would be of medium size (3-10") size material. This is expected to produce varying intensity of burns, with a majority of the burned area in a low to moderate burn intensity. The effects here would vary, depending on the amount of low to moderate burn percentage across the treatment areas. A small percentage of the thin and burn sites (0-1%, or approximately 0-5 acres) are expected to have a high intensity burn due to fuel arrangements after the pre-commercial thinning. Machine piles would also be burned, and because of the large fuel accumulations, are always high intensity burn sites to soils. There are expected to be approximately 20-40 acres of machine piles that would be high intensity burn sites. It is anticipated that there would be less high intensty burns from the follow-up maintenance burning treatments because of the prior fuel treatments and prescribed fire. Less than 1% of the area is anticipated to burn at high intensity (0-80 acres).

With the implementation of BMPs SW2, SW3, and SW7, the effects to soil resources would not be significant and minimal for Alternative C. Since there would be a time lag of from one to three years or more between the initial, second, and subsequent maintenance prescribed burning, the effects are not considered as additive but separate direct effects. Only activity slash would be piled and burned, so the existing course woody debris would remain on-site, hence there would be no affect to long-term soil productivity.

Table 3-14: Summary of Direct Soil Effects for Alternative C, Victorine WUI project.

Alternative C Actions		**Measure**		
	Treatment Acres	**Estimated Acres of High Intensity Burns**	% Treated Acres	% Project Area (19,915 acres)
Initial Prescribed Burning	8,195	0-410	< 5%	< 2%
Second Prescribed Burning (includes pile burning)	951	20-45	2-5%	0.1 - 0.2%
Maintenance Burning	8,407	0-80	<1%	< 0.2%
Alternative C Actions		**Measure**		
	Treatment Acres	**Estimated Acres of Soil Disturbance**	% Treated Acres	% Project Area (19,915 acres)
Thinning and Machine Piling	1,756	145-245	8-14%	0.7 – 1.2%

Cumulative Effects

The cumulative effects analysis for soils for Alternative C considers the same projects, scale and time frame as described in Alternative A and B. Refer also to Tables 3-1 and 3-2, and 3-12 for descriptions of the past, ongoing and reasonably foreseeable actions.

Upper Clear Creek

The same assumptions used in Alternative B apply to Alternative C; therefore, the past actions have disturbed approximately 14,870 acres. With Alternative C, an additional 145-245 acres of ground disturbance, as well as 20 up to 535 acres of high intensity burns would potentially occur (including post treatment maintenance burning), for a maximum total ranging from 165-780 acres of ground disturbance and high intensity burns. The same acres of disturbance would occur for past future and foreseeable actions as described in Alternative B above. Table 3-15 summarizes the cumulative effects of Alternative C of the Victorine WUI project in combination with other past, ongoing and future projects.

Table 3-15: Cumulative Effects Summary of Ground Disturbing Impacts Considering Past, Ongoing and Future Actions in Upper Clear Creek Watershed (203,000 acres) with Alternative C.

Acres Disturbed in Alt. C	**Past Disturbance (acres)**	**Ongoing & Future Disturbance (acres)**	**Total Disturbance (acres)**	**% Of Watershed**
165-780	14,870	2,200	17,235 – 17,850	8.5 - 8.8%

Considered together, the projects disturb less than 9% of the Upper Clear Creek watershed. The past use of BMPs has been effective in mitigating the impacts of bare soil from ground disturbance during past management actions and it is believed that the effects from this Alternative would not be significant and minimal to soil resources within the watershed.

Overall, each action alternative disturbs less than 9% of the Upper Clear Creek watershed. The effects from either Alternative B or C would not be a significant effect and would be minimal to soil resources within the watershed.

Water

The following section pertaining to the affected environment and effects of the alternatives on the water resource is summarized from the *Soil and Water Specialist's Report,* by Fleishman, dated June, 2005 (PR# SR18).

Affected Environment

Water Quality

East Clear Creek (HUC 1502000808-19,912 acres, is the watercourse that the Victorine WUI project may impact. East Clear Creek 6th code watershed is within the fifth code Upper Clear Creek watershed that totals about 203,000 acres. In the 1996 and 1998 Arizona Water Quality Assessment by ADEQ, East Clear Creek reaches 15020008-009 (ECC hdwt-Yeager Canyon), 15020008-008 (ECC, Yeager-Willow), and 1502008-009off4 (Barbershop Canyon, hdwt-ECC) are in full compliance for all designated uses. East Clear Creek reach 1502008-008offBUCK (Buck Spring Creek, hdwt-Leonard Canyon) is in partial support with dissolved oxygen and turbidity being the stressors on aquatic and wildlife designated uses. This assessment was made only once in 1995, and as such, does not have enough sample data to put it on the impaired stream list. These parameters were exceeded only below the hatchery. Jacks Canyon is not perennial, and as such, was not monitored in the 1994 or 1996 report. In 1994, East Clear Creek reaches 15020008-008, 1502008-009, and 15020008-009off4 were all in full compliance for designated uses. The designated uses for East Clear Creek reach include the following: 1) Aquatic and Wildlife; 2) Full Body Contact; 3) Fish Consumption; 4) Agricultural Irrigation Watering; and 5) Agricultural Livestock Watering.

Streamcourses

A riparian assessment using the BLM's Proper Functioning Condition (PFC) protocol and scoresheet was accomplished in the East Clear Creek portion of the Bucks Springs

allotment in the summer/fall of 1995, 1998 and 1999. Of the approximately 128 miles of streamcourses within the allotment area, roughly 37 miles are riparian. Of those, 34 miles are in proper functioning condition (Yeager, Leonard, East Clear Creek and an unnamed reach below Limestone Canyon), and 3 miles are at-risk (Limestone Canyon). The stressors on the riparian system include grazing by ungulates (cows and elk), recreation activities (dispersed camping and ATV use), road location and density, timber management activities, and fire management activities. There are roughly 30 miles of perennial streams within the Victorine project area. They include: Leonard Canyon, Yeager Canyon, and East Clear Creek. The reaches in Leonard and Yeager are interrupted perennial reaches.

Table 3-16: Riparian Condition of Reaches- in the Victorine WUI Project Area

Reach Name	Reach ID #	Miles	Rating
East Clear Creek	1502000808A003	9.6	PFC
East Clear Creek	1502000808A004	1	PFC
Leonard Canyon	1502000808B001	8.9	PFC
Leonard Canyon	1502000808B002	4.2	PFC
Leonard Canyon	1502000808B003	1.3	PFC
Leonard Canyon	1502000808B004	2.9	FUNCTIONAL AT-RISK
Tributary to East Leonard Canyon	1502000808B005	1.4	PFC
Yeager Canyon	1502000808C001	2.8	PFC
Yeager Canyon	1502000808C002	1.9	PFC
Yeager Canyon	1502000808C003	2.7	PFC
	TOTAL	36.7	

Wetlands

No lentic (ponded water) wetlands occur within the Victorine project area.

Water Rights

The entire project area is currently under adjudication within the Little Colorado Watershed (East Clear Creek). The Little Colorado River Watershed adjudication concerns two matters, the claims to the water by Northern Arizona Indian Nations and the claim to the water by permittees and industrial users. This adjudication is currently in the State Supreme Court. There is also one current instream flow application for East Clear Creek for 0 .1 cubic feet per second (cfs). The application process has not been completed.

Roads

Currently, there are approximately 117 miles of known roads within the project area. 71 miles are open roads, 17 miles consist of roads previously closed, and 29 miles of roads

have been previously obliterated. The existing open road system is located primarily in on elevated plains and ridge tops, however, there are some open roads that are located in or are directly adjacent to filter strips. These open roads primarily cross non-riparian filter strips. Approximately 1 mile of open road within the Victorine WUI project area is impacting the function of the filter strip. There are also about 3 miles of roads that have been closed or obliterated previously that still impact stream flows by constricting water movement. All of the road impacts mentioned are have been analyzed and are part of action alternatives under consideration in the East Clear Creek Watershed Health Project and thus are not being considered in the Victorine WUI project.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects
There are no direct effects to water quality within this alternative. There are potential, unquantifiable indirect effects from not treating ladder fuels that could lead to an increased risk of stand replacing, high intensity wildfires.

Cumulative Effects
Cumulative effects of the Victorine WUI project to the water resource would include past, ongoing and future foreseeable actions such as timber sales and thinning that that may involve mechanized equipment that can create ground disturbance. The geographic setting for the cumulative effects analysis will include the Upper Clear Creek 5th code watershed (formerly known as East Clear Creek 5th code). The timeframe for past actions is 10 years. Refer to Tables 3-1 and 3-2 at the beginning of this chapter for a list of actions considered in the cumulative effects analysis for this resource.

Upper Clear Creek
Alternative A would not add any additional ground disturbing activities within the Upper Clear Creek watershed; therefore, there would be no direct cumulative effect from this alternative.

Alternative B: Proposed Action

Direct and Indirect Effects
As stated in the *Soils* analysis in the previous section, the total acres disturbed in this Alternative would be 6 to 355 total acres. These disturbed sites have potential to detach sediments and move these sediments off-site. However, the application of BMPs SW4 and SW5 are designed specifically to provide a filter strip for sediments from prescribed burning activities.

An indirect effect of thinning and piling activities may be the use of heavy mechanized equipment and contractors camping on-site during activities, which can also negatively

affect water quality. The effects are hazardous materials spills and uncontrolled sanitation facilities. This is mitigated through BMP SW-1.

Cumulative Effects
The cumulative effects analysis for water for the action alternatives considers the same projects, scale and time frame as described in Alternative A. Refer also to Tables 3-1 and 3-2 for descriptions of the past, ongoing and reasonably foreseeable actions.

Upper Clear Creek

The cumulative effects analysis for water considers the same past and ongoing timber sales in Upper Clear Creek watershed (203,000 acres) as the *Soils* analysis. All of the ongoing and reasonably foreseeable actions listed in Table 3-12 are considered as well. The cumulative effects analysis in the *Soil* analysis is germane to the *Water* cumulative effects analysis. Table 3-13 above summarizes the total acres of expected cumulative ground disturbance with the acres disturbed from Alternative B. The total acres of ground disturbance are less than 9% of the entire Upper Clear Creek watershed. All of the treatments proposed in the Victorine WUI project are designed with sediment reduction BMPs in place. Therefore, Alternative B is not expected to detrimentally affect water quality or beneficial uses in the Upper Clear Creek drainage system.

Alternative C: Modified Proposed Action

Direct and Indirect Effects
As stated in the *Soils* analysis, the total acres disturbed in this Alternative would be 165 to 780 total acres. Disturbed sites have potential to detach sediments and moved these sediments off-site. However, the application of BMPs SW4 and SW5 are designed specifically to provide a filter strips to capture sediments mobilized from prescribed burning activities. BMP SW8 is designed to minimize impacts from machine piling to filter strips and minimize sediment movement and maintain water quality.

Indirect effects from the use of heavy equipment and contractors camping on-site during project implementation are hazardous materials spills and uncontrolled sanitation facilities. These problems can negatively affect water quality. This is mitigated through BMP SW1, therefore, there is not expected to be an indirect effect from these activities.

Cumulative Effects
The cumulative effects analysis for water for Alternative C considers the same projects, scale and time frame as described in Alternative A and B above and in the *Soils* analysis previously. Refer to Tables 3-1, 3-2, and 3-12 for descriptions of the past, ongoing and reasonably foreseeable actions.

The cumulative effects analysis in the *Soil* analysis is germane to the *Water* cumulative effects analysis for Alternative C. Table 3-15 above summarizes the total acres of expected cumulative ground disturbance with the acres disturbed from Alternative C. The

total acres of ground disturbance are less than 9% of the entire watershed. All of the treatments proposed in the Victorine WUI project are designed with sediment reduction BMPs in place. Therefore, Alternative C is not expected to detrimentally affect water quality or beneficial uses in the Upper Clear Creek drainage system.

Wildlife

Affected Environment

The following describes the affected environment of wildlife, which includes: habitat components, wildlife species considered in this analysis, plants, fisheries, and management indicator species. Threatened, endangered, and Forest Service Sensitive species are also documented. In-depth habitat and species descriptions are contained within the following reports: *Wildlife Specialists Report for the Victorine WUI Project*, by Taylor, dated May 29, 2005 (PR# SR25); *Final Biological Assessment and Evaluation for Threatened and Endangered Species, Victorine WUI Project*, by Spaeth and McGuinn, dated August 5, 2005 (PR# SR26); *Noxious Weed and Sensitive Plant Survey Summary* by Crisp, dated August 20, 2004 (PR# SR1); and the *Analysis of Effects of Fuels Reduction Prescriptions on Selected Aquatic Resources, Victorine WUI Project*, by Taylor, dated June 1, 2005 (PR# SR7). Data and conclusions from these reports are incorporated by reference and summarized here. Management indicator species habitat, and their populations are discussed in detail within the *Wildlife Specialist Report for the Victorine WUI Project* (PR# SR25), and are summarized here.

Habitat Component Summary

Snags

The Coconino National Forest has established a minimum requirement of two snags per acre on 50% of forested acres (USDA 1987). Victorine Wildland Urban Interface analysis area does not currently meet these Forest Plan standards and guidelines. For the ponderosa pine vegetation type, the standard and guideline is to leave at least 2 snags per acre (Forest Plan Amendment 11, p. 65-10). Snags were surveyed during the Buckhorn Timber Sale (1993) on approximately 16,000 acres. On about 15% of the area, 2 or more snags per acre existed. On 2% of the area, 1 or more snags (developing) occurred. Snags were deficient on 85 % of the area. More recently, snags were surveyed for this analysis (2000), and on average, less than 0.5 snags per acre were present. One reason for this low number of snags per acre is that past management practices (prior to the late 1980's) on both forest and private lands eliminated most of the snags and managed against recruitment snags. Before the mid-1970s, every other section was owned by the Arizona Timber and Cattle Company, (AZTEC Company). The area was treated with overstory removals prior to the Forest Service acquiring the land. These treatments removed all large trees that would have contributed to snag creation.

Logs

The Victorine project area contains an average of four to five large logs (12" diameter and greater than 8' long) per acre, which is well over the 2 or more recommended in the Forest Plan for goshawk habitat, and should provide substantive amounts in Mexican spotted owl (MSO) habitat (Mogollon Rim Ranger District data files). For the ponderosa pine vegetation type, the standard and guideline is to leave 3 downed logs per acre (Forest Plan Amendment 11, p. 65-10). Logs contribute to ground fuels, and are within the 1,000 hour fuel category. This means that a reduction in the number of logs across the landscape is an objective in WUI fuel reduction projects. Logs, however, are very important in providing cover for small mammals, and retaining large number of logs for use by wildlife can often conflict with fuels reduction.

Cover

Animals utilize cover to modify extremes of weather, shelter their young, and avoid detection and or capture by predators. Thermal cover is desired for bedding and travel areas, while hiding cover is important adjacent to dependable water, key openings, and paths used for travel.

The project area meets Forest Plan recommendations for cover (30% cover in each habitat, with a minimum of 10% hiding and 10% thermal cover). Victorine has adequate cover on about 6,800 acres, or 38% of the project area. Hiding cover is abundant on 26% of the area, primarily around canyon rims, canyon headers, waters and travel corridors. Hiding cover is well distributed and contributes to ladder fuels. Thermal cover is scattered on 890 acres, or 5% of the area, and contributes to ladder fuels. Combination cover includes both hiding and thermal cover, and is found on 1310 acres, or 7% of the area. Since thermal cover is found on 890 acres, and in combination with hiding cover on 1310 acres, the total amount within the project area is about 2200 acres, or 12%, and meets the Forest Plan guidelines of at least 10% of the landscape.

Old growth

Old growth occurs in multi-story stands with numerous snags, and much dead and down material, which contribute to fuel loading across the landscape. Many of the threatened, endangered, and sensitive avian species of Region 3 have a strong association with old growth conditions, which provide feeding and nesting habitat (Ganey 1992, Block and Finch 1997).

As mentioned previously, much of the area was owned by the AZTEC Company, which removed the overstory trees. The result of these past practices is that the Victorine area does not meet Forest Plan guidelines for 20% old growth in each forest type. Existing old growth is currently limited to 3% of the area (827 acres), with another 6% (1,080 acres) having some of the characteristics while lacking others. The lack of large trees and snags are the primary limiting factors that keep other habitat from being classified as old growth. Another 11% of the area (1,980 acres) has been designated as developing old growth

stands, where the management emphasis is to grow large trees and provide for future snags and logs.

This project attempts to create large trees for the future by thinning from below. This thinning should promote more vigorous tree growth, and protect existing large trees from large wildland fires. Additionally, in areas identified as old growth or developing old growth, thinning slash would be piled and burned, instead of broadcast burned. This would protect the existing overstory, snags, and logs from fire damage. In this manner, the project area would have a positive trend toward Forest Service guidelines of 20% old growth in each habitat.

Big Game and Birds

The project area is summer range for game species such as elk, deer, turkey and bear. The project area provides habitat for many birds, including neotropical migrant birds, resident species and raptors. Habitat for migratory bird species including the olive-sided flycatcher, Cordilleran flycatcher, and Purple martin are found in the project area. The project area also provides habitat for numerous species of raptors including, but not limited to the sharp-shinned hawk, Cooper's hawk, northern goshawk, black hawk, zone-tailed hawk, red-tailed hawk, and kestrel. Additionally, bald eagles may use the area during the fall and winter months, and Mexican spotted owls inhabit the area. Golden eagles generally frequent more open habitat, especially grasslands, and are rarely observed in the project area. The bald eagle and Mexican spotted owl are discussed in more detail under the Threatened and Endangered Species effects analysis portion of this section. The peregrine falcon and northern goshawk are discussed under effects to Sensitive species in this section. Effects to selected migratory bird species are found in the Migratory Bird portion of this section. These various big game, migratory bird, as well as threatened and endangered, Forest Service Sensitive, and management indicator species, are described in detail in the *Wildlife Specialist Report for the Victorine WUI Project*, by Taylor, dated May 29, 2005 (PR# SR25). Species habitat, population trends, and management recommendations are also found in the report.

Native Fish Species

East Clear Creek historically supported five native fish species. These are: Little Colorado spinedace, *Lepidomeda vittata*; Little Colorado sucker, *Catostomus sp*.; speckled dace, *Rhinichthys osculus*; bluehead mountain-sucker, *Pantosteus discobolus* and the roundtail chub, *Gila rubusta*. Of the five native fish species that inhabit the watershed, the rarity of the Little Colorado spinedace exhibits an apparent heightened level of sensitivity to conditions within the watershed. Under Federal protection of the Endangered Species Act, the spinedace has been listed as a threatened species since 1987 (USDI 1987). Given the species sensitivity and legal status, the spinedace is considered the “weak link” of the East Clear Creek ecosystem. The spinedace is therefore used to represent the fish group as a whole when considering overall habitat conditions. The reasoning for using spinedace to represent the other native fishes is based on the reason that any effects from

management activities to spinedace, and/or their basic habitat requirements, would equally affect the other fishes. A detailed discussion of these five fish species, their occupied or preferred habitats of these fishes is contained in the *Analysis of Effects of Fuels Reduction Prescriptions on Selected Aquatic Resources* by Taylor, dated June 1, 2005 (PR# SR7). The roundtail chub and the Little Colorado sucker are Region 3 Forest Service Sensitive Species. Effects of the alternatives to the Little Colorado spinedace are found in the discussion of Threatened and Endangered species portion of this section; effects to the roundtail chub and the Little Colorado sucker are discussed in the Sensitive Species portion of this section.

Threatened and Endangered (T&E) Species

There is potential habitat for one federally endangered species and habitat for four threatened species within the project area (Table 3-17). No proposed species or their habitats are within the project area.

Table 3-17: Federally Threatened Species with Potential Habitat within the Victorine WUI Project Area.

Species	Scientific Name	Status	Project Area Status
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Federally Endangered	Potential Habitat, 4.5 miles along East Clear Creek
Bald Eagle	*Haliaeetus leucocephalus*	Federally Threatened	Present
Mexican Spotted Owl	*Strix occidentalis lucida*	Federally Threatened	Present
Chiricahua Leopard Frog	*Rana chiricahuensis*	Federally Threatened	Historic Record
Little Colorado Spinedace	*Lepidomeda vittata*	Federally Threatened	Present

Southwestern Willow Flycatcher

No suitable habitat for the Southwestern willow flycatcher occurs in the project area or in adjacent areas. The potential habitat along East Clear Creek falls within an elevational range where breeding flycatchers have not been found. The steep-walled canyons, and high-gradient stream channel of the creek does not sustain suitable habitat. Surveys completed in 1994, 1998, 2000 and 2002 did not record this species.

Bald Eagles

Bald eagles are infrequently encountered in the project area, and only during the winter months and during migration. They use clumps of large trees and snags on canyon slopes for roosts near the East Clear Creek drainage. There are no known bald eagle roost sites in the project area, but since the area is generally inaccessible in winter, extensive surveys have not been conducted.

Mexican Spotted Owl

On the Coconino National Forest, the Federally threatened Mexican spotted owl (MSO; USDI 1993) occupies mixed conifer and ponderosa pine-Gambel oak vegetation types, usually characterized by high canopy closure, high stem density, multi-layered canopies within the stand, numerous snags, and downed woody material. MSO inhabit the steep canyon slopes of the project area.

The entire project area has been surveyed for Mexican spotted owls according to Region 3 protocols (various portions: 1989-2004), and segments of twelve MSO Protected Activity Centers (PACs) occur in the Victorine WUI project area, totaling 4,998 acres (23% of project area) (Table 3-18). PACs are monitored periodically for occupancy and productivity. Monitoring data indicates that two of the twelve PACs are unoccupied (no presence detected since the early 1990's). Of the remaining ten PACs, one was initially located in 2000, with the others designated prior to 1994. Owls were located in all ten PACs between 2000 and 2004. Steep slopes and canyons with rocky cliffs characterize much of the suitable nesting/roosting owl habitat (1,148 acres). Within the project area, 158 acres of pine-oak and 65 acres of mixed conifer have been identified as target threshold habitat for MSO. The majority of the rest of the project area consists of pure ponderosa pine on flat or gently sloped terrain, and is classified as unrestricted habitat for the MSO.

Table 3-18: Breakdown of Mexican Spotted Owl Habitat Classifications in the Victorine WUI Project Area

MSO Habitat Classification	Acres
Protected Habitat	
Protected Activity Centers (PACs)	4,998
Steep Slopes	1,148
Restricted Habitat	
Pine-Oak (158 acres is Target Threshold)	1,588
Mixed Conifer (65 acres is Target Threshold)	253
Unrestricted Habitat	
Other Forest and Woodland Types	11,928
Grand Total	*19,915*

Chiricahua Leopard Frog

The Chiricahua leopard frog, listed as Federally threatened on July 15, 2002 (USDI 2002) is known currently or historically from cienegas, (mid-elevation wetland communities often surrounded by arid environments), livestock tanks, (i.e., small earthen ponds), lakes reservoirs, streams, and rivers at elevations of 3,000 to 9,000 feet in central and southeastern Arizona.

A few historic locations of Chiricahua leopard frogs exist from East Clear Creek and Leonard Canyon. Arizona Game and Fish Department frog surveys conducted in 1992-1995, and fish surveys conducted in 1998-2002 did not relocate these species on the project area. The nearest intact population of Chiricahua leopard frogs is located in the about 20 miles from the project area.

On the boundaries of the Victorine WUI project area, East Clear Creek, and two major tributaries in Yeager and Leonard Canyon provide historic habitat that is considered suitable habitat. Historic locations in and near the project area are from perennial streams. Suitable habitat has been compromised by the presence of nonnative fish and crayfish. Most of the project area is within one mile of water sources, which include perennial and intermittent streams, springs, earthen stock tanks, and shallow natural pools. Earthen stock tanks in the project area are generally devoid of riparian and aquatic vegetation, and do not provide potential habitat for frogs.

Little Colorado Spinedace

The Little Colorado spinedace is endemic to the Little Colorado River Basin. Little Colorado spinedace was listed as Federally threatened in 1967, critical habitat was designated in 1987, and the recovery plan (USDI 1998) was approved in 1998. East Clear Creek (a major drainage within the Little Colorado River Basin) is identified as containing critical habitat for this species of fish. Critical habitat for the spinedace is designated in East Clear Creek from Potato Lake in the headwaters to Blue Ridge Reservoir and below the Blue Ridge Dam to the confluence with Leonard Canyon. It lies along the boundary of the project area for about ten miles. East Clear Creek, Yeager Canyon, and Leonard Canyon border the project area and are considered suitable and occupied habitat for the Little Colorado spinedace. Little Colorado spinedace have been monitored, since 1995 by the Arizona Game and Fish Department and the Forest Service, at sites along East Clear Creek below Blue Ridge Dam and in tributary streams. Besides East Clear Creek, fish have been counted and recorded in West Leonard Canyon, Yeager Canyon, Dane Canyon and Dines Tank.

Forest Service Sensitive Species

Several Region 3 Forest Service Sensitive Species are present, occurred historically, and potentially have habitat that could be affected by the project (Table 3-19). Other sensitive species that were not evaluated, and the reasons for their exclusion from analysis are listed in Appendix A of the *Wildlife Specialist Report for the Victorine WUI Project*, by Taylor, dated May 29, 2005 (PR# SR25).

Table 3-19. Region 3 Forest Service Sensitive Species that have Potential to be In or Near the Victorine WUI Project Area.

Species Name	Scientific Name	Status in Victorine Project Area
American peregrine falcon	*Falco peregrinus anatum*	Present. Two peregrine falcon eyries exist in East Clear Creek canyon on the northern boundary of the project area. One eyrie is more than one mile from the proposed treatment area; the second eyrie is about ½ mile from proposed treatment areas. Individual falcons likely forage in the project area.

Species Name	Scientific Name	Status in Victorine Project Area
Northern goshawk	*Accipiter gentilis*	Present. Associated with MA 3 and MA4, which represents about 17,000 acres. There are two known goshawk post-fledging family areas (PFAs) and one designated recruitment PFA within the project area. One of the existing PFAs has been very productive, fledging at least 12 young in the past 14 years. The second PFA fledged 2 young in 1994, and since then, has not been known to have nesting goshawks.
Northern Leopard Frog	*Rana pipiens*	Historic occurrence in aquatic habitats. There is limited potential habitat on the project area for this species. Riparian areas and stock tanks on the project area are not proposed for treatment. No recent locations of northern leopard frogs are known from the project area.
Southwestern (Arizona) Toad	*Bufo microscaphus*	Historic occurance in upland desert and pine-oak drainages. Occupies habitat similar to that of leopard frogs. There is one record of Arizona toads from East Clear Creek.
Rusby's Milkvetch	*Astragalus rusbyi*	Potential habitat in upland high elevation ponderosa pine-Arizona fescue, and ponderosa pine-Gambel oak communities in the project area. This species was not found in 2004 surveys, but the surveys did not fully cover the entire project area.
Flagstaff Beardtongue	*Penstemon nudiflorus*	Potential habitat for this species occurs in the project area.
Roundtail Chub	*Gila robusta*	Known from lower reaches of the Clear Creek drainage, reported in East Clear Creek in 1999, and suitable habitat present in East Clear Creek.
Little Colorado Sucker	*Catostomus sp.*	Relatively common in streams of the subwatersheds within the Little Colorado River Basin.

Management Indicator Species and Trends

A working draft forest-wide assessment entitled "*Management Indicator Species Status Report for the Coconino National Forest*" (USDA 2002a; PR# SR31) summarizes current knowledge of population and habitat trends for species identified as MIS for the Coconino National Forest. Population trends need to be monitored as the Forest Plan is implemented, and relationships to habitat changes over time determined (36 CFR 219.19). The following is a description of each of the management indicator species (MIS) identified for management areas 3 and 4 (MAs 3 and 4) within proposed treatment areas (Table 3-20). There would be no treatments in other MAs within the project area, and MIS for those MAs would not be affected by proposed treatments.

Table 3-20: Management Indicator Species (MIS) within Management Areas 3 and 4, and their Forest-wide Habitat and Population Trends.

Species Scientific Name	Habitat	Management Area #	Forest-wide Habitat Trend	Forest-wide Population Trend
Northern Goshawk (*Accipiter gentilis*)	Late seral ponderosa pine	3 & 4	Declining	Inconclusive
Mexican Spotted Owl (*Strix occidentalis lucida*)	Late seral mixed conifer	3 & 4	Declining	Inconclusive

Species Scientific Name	Habitat	Management Area #	Forest-wide Habitat Trend	Forest-wide Population Trend
Elk (*Cervus elaphus nelsoni*)	Early seral ponderosa pine, mixed conifer	3 & 4	Increasing	Declining[1]
Abert Squirrel (*Sciurus aberti aberti*)	Early seral ponderosa pine	3 & 4	Stable	Inconclusive
Red Squirrel (*Tamiascirus hudsonicus*)	Late seral mixed conifer	3 & 4	Declining	Inconclusive
Turkey (*Meleagris gallopavo*)	Late seral ponderosa pine	3 & 4	Declining	Stable
Pygmy Nuthatch (*Sitta pygmaea*)	Late seral ponderosa pine	3 & 4	Declining	Stable
Hairy Woodpecker (*Picoides villosus*)	Snag component	3 & 4	Increasing	Stable to Increasing

[1] ***Declining elk population is due to hunting activity rather than habitat manipulation.***

Environmental Consequences

Direct, indirect and cumulative effects for each alternative on wildlife and aquatic resources are summarized from the following reports available in the project record: *Wildlife Specialist Report for the Victorine WUI Project*, by Taylor, dated May 29, 2005 (PR# SR25) and the *Analysis of Effects of Fuels Reduction Prescriptions on Selected Aquatic Resources, Victorine WUI Project*, by Taylor, dated June 1, 2005 (PR# SR7). Effects to Forest Service Sensitive Species are summarized from the *Biological Assessment and Evaluation: Sensitive Species Report* by Green, dated February, 2006 (PR# SR29). Effects to Management Indicator Species are found in the Wildlife Specialists Report cited above (PR# SR25) and the *Coconino Forest Management Indicator Species Report* dated July 1, 2002 (PR# SR31). Effects to federally threatened and endangered wildlife species are summarized from the *Final Biological Assessment and Evaluation for Threatened and Endangered Species, Victorine WUI Project*, by Spaeth and McGuinn, dated August 5, 2005 (PR# SR26).

Direct and indirect effects are presented in the following tables: Table 3-21 summarizes the effects to habitat components; Table 3-22 summarizes effects to various big game and bird species; Table 3-23 covers effects to selected migratory birds; Table 3-24 covers effects to federally threatened and endangered species; Table 3-25 summarizes effects to Forest Service sensitive species; and Table 3-26 summarizes effects to Management Indicator Species not already previously discussed. All effects include the implementation of applicable resource protection measures and other BMPs listed in Chapter 2 (Table 2-2).

Cumulative Effects for the proposed Victorine WUI project to wildlife would include past, ongoing and future foreseeable actions such as timber sales, thinning, and prescribed fire that can effect the distribution of habitat components that are important to wildlife. Other impacts considered include noise, smoke impacts from fuel reduction and thinning

projects, and from disturbances from recreation or other forest use. The geographic setting for the cumulative effects analysis includes the Upper Clear Creek 5th code watershed (formerly known as East Clear Creek 5th code), unless otherwise stated. The duration for cumulative effects for the wildlife resource is 10 years for this analysis, as the effects of understory burning and thinning last about 8-10 years, with maintenance burning continuing those effects. Refer to Tables 3-1 and 3-2 at the beginning of this chapter for a list of actions considered in the cumulative effects analysis for this resource. Cumulative effects will be summarized after the direct and indirect effects tables for each of the major wildlife categories such as: habitat components, big game and migratory bird species; federally threatened and endangered species; Forest Service sensitive species and Management Indicator Species.

Direct and Indirect Effects on Habitat Components

Table 3-21. Summary of Direct and Indirect Effects of Alternatives A, B, and C to Habitat Components

	Alternative A	Alternative B Activities		Alternative C Activities	
	No Action	**Thinning 1,682 acres[12]**	**Prescribed Burning 7,498 acres[13]**	**Thinning 1,756 acres**	**Prescribed Burning 8,678 acres[14] initial treatments; 8,407 acres of maintenance burn**
Snags	No direct or indirect effects to snags. The number of snags per acre would remain low on the project area, and would not likely fulfill wildlife needs. Snags would decay and fall in a natural manner	No effect to snags as trees that would be thinned are < 12" DBH. Thinning would result in larger trees over the long-term that would provide for future snags.	Estimate that 15-25% of large snags >16 DBH would be lost. Loss would be greatest in burn/thin/burn areas. Measure WL6 would protect large snags in critical wildlife areas. Snags would be created, but numbers and size class are difficult to predict. Long-term, more snags would be created than Alt. A.	Similar to Alt. B, but more acres thinned which would increase snags in the long term.	Effects similar to Alt. B, but more acres thinned and prescribed burned. Average number of snags per acre would be lower than Alt. B because more acres would be burned overall. Fewer acres of burn/thin/burn would retain more snags than Alt. B. More acres of piling and burning instead of broadcast burning would reduce snag loss in critical wildlife areas. Long term effects would result in more snags than Alt. B.
Logs	No direct or indirect effects to logs. Number of logs per acre would remain relatively high on the project area (4-5 logs per acre), and would fulfill the needs for wildlife. Logs would decay in a natural manner. Habitat for ground dwelling wildlife, which is an important prey-base, would be sufficient. The high coarse woody surface fuel loading, would continue to contribute to potentially high fire severity and high crown fire hazard, which would result in large decreases in the number of logs and other habitat components in an extreme fire event.	No effects to log numbers or distribution.	Short-term losses (30-50%) of logs would occur, even with application of measures WL5 and WL6 (Randall-Parker and Miller 1999; Gordon 1996). Logs per acre would remain at about 4 on about 12,400 acres; and decrease to 1-2 per acre on about 7000 acres. Average logs per acre would be slightly higher than in Alt. C. New logs would fall after prescribed burns. Estimated that 1-2 logs per acres would be maintained in treatment areas.	No effects to log numbers or distribution.	Effects similar to Alt. B – 30-50% of existing logs would be lost, even with WL5 and WL6 applied. 468 acres would be thinned, piled and burned in important wildlife areas, MSO PACs. Goshawk PFAs, and old growth blocks which would retain most logs. Average logs per acre would be slightly lower than Alt. C, decreasing to about 1-2 logs per acre. New logs would fall after prescribed burns. Maintenance burning would lower fuel loading, and reduce logs. Old growth stands and goshawk PFAs would only be burned once, retaining about 2-4 logs per acre.

[12] Includes 10 acres of thin and chip
[13] 782 acres that would be burned twice, before and after thinning. These acres are only counted once.
[14] 468 acres that would be burned twice, before and after thinnning, and 483 acres of pile and burn

	Alternative A	Alternative B Activities		Alternative C Activities	
	No Action	**Thinning 1,682 acres[12]**	**Prescribed Burning 7,498 acres[13]**	**Thinning 1,756 acres**	**Prescribed Burning 8,678 acres[14] initial treatments; 8,407 acres of maintenance burn**
Cover	Project area has about 38% cover and exceeds Forest Plan recommendations. No direct or indirect effects to cover. Cover would likely increase with no action.	Drainages would not be treated, SW 4, WL 5. , maintaining cover. Hiding cover would be reduced by thinning ladder fuels, while thermal cover would be maintained. Combination cover would be reduced to thermal cover.	Burning would not affect thermal cover but would convert 50% hiding cover to no cover and 50% of combination cover to thermal cover in treatment areas. Cover values would be retained on about 81% of the acres treated that had existing cover values.	Similar to Alt. B. Cover values would be retained on about 80% of the acres treated that had existing cover values.	Similar to Alt. B. Cover values would be retained on about 84% of the acres treated that had existing cover values.
Old growth	3% of the project area is old growth; 17% is developing old growth. No direct or indirect effects to old growth. Future wildfire would threaten the remaining old growth and developing old growth and reduce the amount in the project area.	About 50 acres of existing old growth and 175 acres of developing old growth would be thinned from below, with no old growth trees cut. Trees cut would be <12"DBH. The remaining 695 acres of existing and 1300 acres of developing old growth would not be treated. Indirect effects of thinning would include a reduction of wildfire risk to trees and increased tree growth over the 225 acres.	About 225 acres of existing and developing old growth would be burned after thinning. Another 85 acres of existing old growth and 1485 of developing old growth would be broadcast burned. The remaining 695 acres of existing and 1300 acres of developing old growth would not be treated. Broadcast burning may damage some old growth trees vulnerable to fire; mortality is estimated to be < 5%. WL6 would protect old growth trees. New snags may be created in old growth and developing old growth stands. Over the long-term these would replace those lost from burning. Old growth stands would be burned only once to reduce losses. WL5 and WL6 would reduce snag loss in these stands. Treatments would promote faster conversion of developing old growth to older forest stands.	About 50 acres of old growth and 125 acres of developing old growth would be thinned from below, with no old growth trees cut. The slash would be piled and burned rather than broadcast burned. WL8 would be applied to protect old growth trees during piling and burning. Thinning would release younger trees that remain, and enhance conditions for older trees.	Similar to Alt. B but more acres would be treated. About 190 acres of old growth and 1350 acres of developing old growth would be broadcast burned. Mortality from burning is estimated at < 5%. WL6 would protect old growth trees. WL5 would be used to protect existing snags. Pretreatment of fuels in the broadcast burn areas of this alternative would create new snags.

Cumulative Effects on Habitat Components

Alternative A – No Action

There would be no adverse cumulative effects to snags or logs from not implementing the action alternatives, when considered along with past, ongoing and future actions in Upper Clear Creek watershed. Persistence of high fuel loading in the project area would increase the risk of severe wildfire effects in the area, resulting in a decrease in logs. There would be no adverse cumulative effects to cover; cover would likely increase in the project area and the watershed even with the ongoing and future actions. There would be no adverse cumulative effects to old growth from not implementing an action alternative; however, the existing fuel loading would increase the risk of severe wildfire that would threaten the remaining old growth and developing old growth in the project area, and the watershed.

Alternative B

This project along with other fuel reduction and watershed health projects (Blue Ridge Urban Interface Project, East Clear Creek Watershed Health Improvement Project) would contribute to an over-all reduction in the number of snags and logs on the landscape within the treated areas. Areas proposed for thinning and prescribed fire total about 44,500 acres or 22% of the Upper Clear Creek Watershed. Some snag recruitment, however, would be expected in treated areas as trees die from being burned during maintenance burning.

Likewise, cover would be reduced across the watershed when the Victorine WUI project is combined with the effects of the other two ongoing and future projects. Fire suppression in the past has, however, created an abundance of cover across the District. Some loss of cover from fuels reduction and watershed health projects should have little impact on the quality of cover presently found on the Mogollon Rim District, and the Upper Clear Creek watershed.

Old growth is below Forest Plan Guidelines in the watershed. A survey and analysis of old growth was conducted in the mid-1990s for the East Clear Creek Watershed Ecosystem Assessment. The watershed that was considered at the time included 128,000 acres. Ponderosa pine made up 92,600 acres (72%) while mixed conifer was found on 17,600 acres (14%). The surveys indicated that within the watershed, existing old growth was found on 3.1% of ponderosa pine, and 24% of mixed conifer. The three recent projects (ongoing and planned) in the watershed would thin 22,887 acres and burn 44,500 acres. For all three projects, developing old growth that is thinned would be treated with a special prescription that is designed to promote increased growth rates and maintain and promote old growth characteristics. These projects would accelerate the development of these stands into existing old growth stands. Past projects since adoption of the Forest Plan in 1987 designated existing and developing old growth stands, and either treated

those stands to promote old growth, or deferred treatment to protect old growth characteristics. This project in consideration with recent past, ongoing and future projects would increase the amount of existing old growth over time.

Alternative C

Cumulative effects to snags and logs from this alternative on snags considering this project along with other ongoing and future fuel reduction and watershed restoration projects in the Upper Clear Creek watershed would affect about 45,180 acres out of the 203,000 acre watershed (22% of the watershed). The effects are primarily from prescribed burning. Cover would be affected similarly to Alternative B; cover has been enhanced by past fire suppression and the loss in cover resulting from this project in combination with ongoing and future projects should have little overall impact on the quality of cover in the watershed. The cumulative effects with respect to old growth are the same as in Alternative B even though the thinning and prescribed fire treatments would be implemented over a slightly larger area, and maintenance burns would be conducted.

Direct and Indirect Effects to Big Game

Table 3-22. Summary of Direct and Indirect Effects of Alternatives A, B and C on Big Game.

Big Game	Alternative A No Action	Alternative B[15] Thinning,1,682 acres Prescribed Burning, 7,498 acres	Alternative C[16] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
Elk	No direct effects to big game because habitats would not be altered. Indirect effects would be increased density of small diameter trees and coincident decrease of shrub, forb and grass species. There would be an increased hazard of wildfires that would alter habitat conditions. These conditions would decrease elk use especially for calving.	Overall, elk habitat would benefit. There could be some localized displacement of elk during project operations, but it would be short in duration, and small in scope. There would be ample habitat nearby that elk could use during project implementation. Thinning and burning would thin out doghair thickets trees and increase their usefulness as calving habitat. Treatments would also enhance plant growth and vigor and improve foraging habitat. These actions would improve elk habitat within the project area, but would not be on a large enough scale to affect Forest-wide population trends.	The additional acres of thinning, (74 acres) and prescribed fires (1,180) and maintenance burning (8,407 acres) would not significantly change the direct and indirect effects from Alternative B, except that there would be additional improvements in big game habitat on about 1,180 acres treated by prescribed fire.
Deer	Similar to the effects above.	Mule deer would benefit in similar ways to elk but would greatly benefit from the increases in understory vegetation. Thinning and prescribed fire would promote increased shrub, grass, and forb production in the understory vegetation layer. Broadcast burning would reduce heavy accumulations of small logs and fuels and add nutrients to the soils that would further promote the development of browse species. Burning would promote buckbrush, a favorite food of deer. The area would improve in suitability for mule deer, but the increase would not be on a large enough scale to affect Forest-wide population trends, which are currently declining.	Similar to the effects above and to Alternative B.
Turkey	Similar to the effects above.	Project activities would improve existing abundant habitat for turkeys by creating openings in the canopy and promoting ground cover vegetation. Thinning and prescribed burning may cause some short-term negative effects to turkeys, as well as some benefits. Burning in the spring would likely cause abandonment of nests, and may kill young poults unable to get away from the fire. Once poults are fairly mobile, the hens and poults often use burned areas for feeding, since insects are often abundant in the newly burned areas. Over the long-term, burning may reduce logs, slash, and a shrubby understory, which may reduce some nesting habitat. Overall, burning is expected to improve understory conditions by removing dense pine reproduction that is overtaking small openings, thereby improving breeding, brooding, and loafing habitat. Large, overstory trees on slopes would not be treated, so project activities would not affect turkey roosts. Habitat in the project area would be enhanced for turkey and may result in increased productivity, but improvements are not at a large enough scale to affect the overall Forest habitat or population trends and would not change the current slightly declining trend in habitat and the stable trend in population numbers for turkey.	Similar to the effects above and to Alternative B.

[15] Includes 10 acres of thinning and chipping. 782 acres would be burn/thin/burn treatments; these acres are only counted once.
[16] 468 acres would be burn/thin/burn treatments and 483 acres are pile and burn.

Bear	Similar to the effects above.	Bears travel and forage throughout the project area, using drainages as travel corridors. The cover habitat in draws important to bears would not be treated, and would not curtail use by bears. The same benefits of thinning and burning that increase understory vegetation would improve forage for bears. New green shoots would provide spring food for bears. Indirect effects to big game from implementing this project would include a decreased hazard of habitat alteration from wildland fires. There would be an improvement in the quality of habitat available for bear because prescribed fire and thinning from below should increase shrub, grass, and forb species that are used as food. The size of the project treatment area would not be large enough to affect the stable Forest-wide population trend for bears. Project activities would not lead to a downward trend in the population of bears.	Similar to the effects above and to Alternative B.

Cumulative Effects to Big Game

Alternative A -- No Action

Over the past 10 years, timber sales have declined and pre-commercial thinning has dropped to a lower rate with the end of the Colorado Plateau Roundwood Contract. The trees that resulted from the 1919 heavy seed crop and regeneration are mature and putting out millions of seeds, contributing to increasing tree densities within the East Clear Creek Watershed, especially in the seedling and sapling classes. The area is currently in the ninth year of drought conditions. These conditions are contributing to declining habitat suitability for many big game species, including deer and elk. The cumulative effect of implementing the no action alternative in combination with past, ongoing and future projects would help to continue the declining trend of habitat quality.

Alternative B

Cumulative effects described for Alternative A document a downward trend in the current projection for habitat suitability for big game species. Projects being undertaken within the watershed, such as the Blue Ridge Urban Interface Project, the East Clear Creek Watershed Health Improvement Project, in addition to this project strive to reverse this trend by opening up dense understory conditions, increase ground cover vegetation, and create small openings interspersed among the forest stands. These three projects would thin nearly 22,900 acres and prescribe burn 44,500 acres that would contribute to improving habitat suitability.

Alternative C

The cumulative effects of Alternative C are similar to Alternative B, except that more acres would be treated and maintenance burning would occur. An additional 1,180 acres would be treated by thinning and prescribed burning, and 8,407 acres of the project area would be treated by maintenance burns.

Direct and Indirect Effects to Migratory Birds

Table 3-23. Summary of Direct and Indirect Effects of Alternatives A, B and C on Migratory Birds

Migratory Birds	Alternative A No Action	Alternative B[17] Thinning,1,682 acres Prescribed Burning, 7,498 acres	Alternative C[18] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
Olive-sided flycatcher, Purple martin, Cordilleran flycatcher (Arizona Partners in Flight priority species excluding TES species)	Past management practices and fire suppression has limited the existing habitat for olive-sided flycatchers or purple martin. There would be no improvement in habitat conditions for those species in this alternative.	Two of these species prefer open pine habitats, while one prefers dense canopies. Maintenance of diverse structural components in the pine and mixed conifer habitat types is important. This alternative would enhance the diverse structural component of the project area by creating openings and retaining large snags. There would be increased growth on remaining trees, which would improve the large tree component of the project area over the long-term. The area would increase in open habitat structures, though smaller snags would decrease over the short-term. Open habitats would benefit the olive-sided flycatcher and the purple martin, while a decrease in snags would be unfavorable. Dense conifer habitat would decrease in thinned areas, and logs and snags would decline in areas of broadcast burning. These effects would decrease the amount of habitat for the Cordilleran flycatcher. Sufficient habitat would remain for this species, in drainages and draws, to maintain viable populations of flycatchers.	The additional acres of thinning, (74 acres) and prescribed fires (1,180) and maintenance burning (8,407 acres) would not significantly change the direct and indirect effects of Alternative B, except that there would be additional improvements in habitat for the olive-sided flycatcher and purple martin on these acres, while habitat quality would decline by a small amount for the cordilleran flycatcher. The first two species would increase in population size, while the Cordilleran flycatcher would decline. Sufficient habitat for all three species would maintain viable populations.

Cumulative Effects on Migratory Birds

Alternative A – No Action

There is currently a wide array of diverse habitats in the watershed, though a century of fire suppression has resulted in increasing tree densities and the loss of open meadows and open forest stands. Also, because of past management practices, the project area has few large trees, old growth, and snags, especially on areas previously owned by the AZTEC Company. Many stands are stagnant due to dense conditions and heavy regeneration of pine. The cumulative

[17] Includes 10 acres of thinning and chipping. 782 acres would be burn/thin/burn treatments; these acres are only counted once.
[18] 468 acres would be burn/thin/burn treatments and 483 acres are pile and burn.

effect of implementing the no action alternative in combination with past, ongoing and future projects would not significantly improve the declining trend of habitat conditions for these species.

Alternative B

Similar conditions exist throughout the Upper Clear Creek watershed, with an abundance of dense stands (mid-size and small trees), tree encroachment into meadows, snags below Forest Plan guidelines, and a lack of open forest stands. The Blue Ridge Urban Interface Project, the East Clear Creek Watershed Health Improvement Project, in combination with this alternative would reverse these trends on over 22,900 acres that would be thinned and 44,500 acres that would be prescribed burned and together contribute to improving habitat conditions. Overall, habitat would improve for the Olive-sided flycatcher and the purple martin, while habitat would decline for the Cordilleran flycatcher. Populations would increase for the first two species, but would decline for the Cordilleran flycatcher. Sufficient habitat would remain for all three species to maintain viable populations.

Alternative C

The cumulative effects of Alternative C are similar to Alternative B, except that more acres would be treated and maintenance burning would occur. An additional 1,180 acres would be treated mainly by broadcast burning, and 8,407 acres of the project area would be treated by maintenance burns. The effects to the three species would improve and decline by a small amount relative to the increase in treated acres.

Direct and Indirect Effects to Threatened and Endangered Species (T&E)

Table 3-24- Summary of Direct and Indirect Effects of Alternatives A, B, and C to Threatened and Endangered Species

T&E Species	Alternative A No Action	Alternative B[19] Thinning,1,682 acres Prescribed Burning, 7,498 acres	Alternative C[20] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
Southwestern Willow flycatcher	No treatments would occur so there would be no direct or indirect effects on southwestern willow flycatchers or their habitat.	No direct impacts to nesting birds would occur, as no species are known in potential nesting habitat areas. Measures SW5 and WL4 would protect and maintain potential habitat areas along riparian buffers. Treatments are at least one mile from East Clear Creek, and within ½ mile of potential habitat. Beneficial indirect effects to habitat are expected as dense stands are thinned out, fire is reintroduced into the ecosystem, and ground cover increases. This would likely result in increases in water infiltration into the soil, and slight decreases in the flashiness of the runoff during rain and snow events. This would reduce the amount of flood scouring of the willow communities, and may allow them to mature towards suitability and become more stable to provide habitat.	Effects would be the same as in Alternative B.
Bald Eagle	There would be no direct, or indirect effects to bald eagles. Trees available for roosts and perches would not be affected, and prey would not be affected.	No effect to bald eagles. The project area provides limited foraging opportunities for eagles in the fall and winter. There are no large bodies of water nearby that would provide waterfowl and fish. Carrion is sporadically available during the fall hunting season. There are no known bald eagle roost sites in the project area, though potential sites are located on the slopes into canyons along the perimeter of the area. Foraging opportunities would not be affected for bald eagles. Potential roost habitat on canyon slopes would not be treated in the project. Some snags that serve as available perches for eagles would be lost during broadcast burning; however some added recruitment snags would be created. Large pine trees that provide for recruitment snags would experience very low mortality rates, but would be available for future snags. Over 10,000 acres of the project area would not be treated, and sufficient trees and snags would be available for perches.	Effects would be the same as in Alternative B.
Mexican Spotted Owl	There would be no direct effects to MSO. There would be a continuing and increasing risk of catastrophic wild fires that could dramatically affect MSO habitat within the project area. The MSO Recovery Plan lists wildfire as one of the major threats to the recovery of the species. Many MSO PACs within the watershed are currently at risk from severe	Minor adverse direct effects in three PACs to large trees, snags and logs from prescribed fire mitigated to non-significant effect by resource protection measures. Benefit to other MSO habitat from thinning and prescribed fire with the same minor adverse direct impacts. No effects to owls during the breeding season (WL1). Long-term beneficial indirect impacts. Twelve PACs occur in whole, or in part, in the project area, and are at risk from wildfires. Eleven of the twelve PACS are within one-half mile of proposed treatment areas. A total of 135 acres within three MSO PACs would be treated with 110 acres of broadcast burn and 25 acres of thin and burn. Only one PAC would be thinned (PAC #040708). Thinning would remove understory trees up to 9 " DBH, and leave a variable tree spacing with small clumps of trees interspersed with openings (WL7). No thinning would occur within the 100 acre nest buffer, and thinning would take place outside of the breeding season (WL1, WL7). Burning within PACs would follow a special prescription with measures designed to protect characteristics important to the MSO (WL5, WL6, WL8, WL10, WL11). Large snags	Effects would be similar to Alt. B. Minor adverse direct effects to large trees, snags, and logs would be lessened as compared to Alt. B because fewer acres in PACs would be treated, 25 versus 135 acres. Less MSO habitat would be treated as well, 1185 versus 1310 acres. Key differences between the alternatives include a reduction of acres treated within PACs, and on steep slopes, and a change of prescription from broadcast burning to thin and pile on 485 acres. No effects to owls during the breeding season (WL1). Long-term beneficial indirect impacts. Treatments would occur adjacent to 10 PACs and in one MSO PAC (#040708). 25 acres would be treated in this PAC: 5 acres of thinning < 9"DBH trees and piling slash; 20 acres of maintenance thinning and burning. Treatments would be located on the western edges of the PAC boundary, outside the core area of the PAC. Thinning would

[19] Includes 10 acres of thinning and chipping. 782 acres would be burn/thin/burn treatments; these acres are only counted once.
[20] 468 acres would be burn/thin/burn treatments and 483 acres are pile and burn.

T&E Species	Alternative A No Action	Alternative B[19] Thinning,1,682 acres Prescribed Burning, 7,498 acres	Alternative C[20] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
	wildfires, which if they occurred, would greatly decrease habitat suitability, and could potentially cause owl populations to decline.	(>18" DBH) and large trees that are suitable nest trees would be lined to reduce loss to fire. Test burning would occur prior to burning within the PACs to ensure that conditions are adequate to ensure the retention of more snags and logs than in other areas. About 1310 acres of MSO habitat occurs in areas proposed for treatment. In addition to the 135 acres within three PACs, 175 acres of Protected Habitat on steep slopes and 1000 acres of restricted habitat (pine-oak) would be treated mostly by broadcast burning. 170 acres of restricted pine-oak habitat would be thinned from below (up to 12" DBH) and burned following WL9. WL8 and WL6 would be used to reduce effects to snags and logs. Thinning rescriptions would be implemented to maintain a wide range of tree sizes, multi-layered canopies, and plant species richness in those acres. Burning within PACs, target threshold and restricted habitat areas would aim to achieve retention of habitat components listed in WL10, and WL11. Burning is expected to reduce canopy no more than 10% and create openings less than ¼ acre in size. The burns would create a mosaic of burned and unburned areas, slightly thin the understory, and would not change the overall structure of the stand. Thinning dense stands would reduce ladder fuels, increase ground vegetation, release the remaining trees and increase tree growth. Burning and thinning treatments would decrease wildfire threats, promote the development of understory vegetation, and mortality of small trees resulting from burning would increase growth on remaining trees. The number of snags and logs would be reduced and ground cover vegetation would increase from prescribed fire. A beneficial effect would be removal of excessive fine fuels that put spotted owl habitat at risk of wildfires. Over the long term, increased tree growth would provide larger trees for recruitment snags. The primary indirect effect is to reduce the risk of high intensity wildfire to MSO PACs, protected, and restricted habitat, over the long term, as recommended in the MSO Recovery Plan. This alternative would improve habitat over time. Productivity or population trends are not anticipated to change in the short-term, and any increases in productivity or population trend in the long-term would be immeasurable. Forest population trends would not be affected.	leave variable tree spacing and small clumps of trees interspersed with small openings (WL7). A 100-acre nest buffer was designated in this PAC where no project activity would occur. Thinning and burning would only take place outside of the breeding season within a ½ mile of the PAC (WL1). The same prescriptions protection measures would apply as in Alt. B (WL5, WL6, WL8, WL10, and WL11. The same objectives and mitigation measures described for Alternative B would apply to Alternative C. 1185 acres of Mexican spotted owl habitat are proposed for treatment in Alt. C. In addition to 25 acres within PACs, 1160 acres of restricted habitat (pine-oak) are proposed for treatment. Most of these acres would be broadcast burned (1060 acres of pine-oak). The same measures to protect large trees, snags and logs would be applied as in Alt. B. 60 acres of restricted habitat would be thinned from below cutting trees < 12" DBH. About 485 acres that would be broadcast burned in Alternative B would be treated with a thin and pile prescription. Five acres are within PAC #040708 and 100 acres are within restricted pine-oak habitat. This change would protect important wildlife habitat from the negative impacts of prescribed burning, such as damage to overstory trees and loss of snags and logs. Pile burning would protect more snags and logs than broadcast burning.
Chiricahua Leopard Frog	No effects to potential Chiricahua leopard frog habitat.	Areas proposed for treatment are on ridge tops away from streamside areas so no direct impacts to potential habitat are anticipated. Ridge tops are generally ½ to 1 mile from East Clear Creek and its tributaries. Filter strips (measures SW4 SW5 and WL4) would minimize the input of ash and sediment into creeks, and maintain the integrity of aquatic habitats. Slight amounts of sediment or ash may enter the creeks, but would have negligible impacts to potential habitat. Stock tanks occur within the project area (12 tanks, all less than ¼ acre in size). No frogs have been detected during surveys, so it is very unlikely that there would be direct effects to the species. Due to runoff, nutrient levels in stock tanks may increase following fire, which would encourage growth of bacteria, algae, and other tadpole foods, benefiting tadpoles. However, if high levels of sediment wash into breeding pools, this could reduce oxygen levels and impact tadpoles. SW4 and SW5 would be followed to minimize sediment inputs to stock tanks, so impacts would be negligible. Thinning dense stands on 1,680 acres and returning fire to 7,500 acres would improve watershed conditions over the long-term by increasing ground vegetation and reducing sediment movement. These conditions would improve potential habitat for the Chiricahua	Effects would be the same as in Alternative B.

T&E Species	Alternative A No Action	Alternative B[19] Thinning,1,682 acres Prescribed Burning, 7,498 acres	Alternative C[20] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
		leopard frog.	
Little Colorado Spinedace	No direct effects to fish and aquatic habitat. Negative indirect effects on fish and aquatic habitat could occur in the event of a stand replacing fire. Effects would include: sediment and ash flows, and potential debris torrents from stand replacing fire that could eliminate stocked spinedace and/or stocking sites.	No direct effects from prescribed fire as effects to soil are minimized by SW3. The project area is downstream of known occupied habitat for the Little Colorado spinedace so the potential for impacts is low. Minor negative indirect effects in the short-term from transport and/or loading of silt and ash within potential stock sites in Yeager canyon. 175 acres of prescribed burning on steep slopes >40% is proposed in Leonard Canyon. Wind and water could transport ash and sediment into the streamcourse. These effects would be minimized by SW4 and SW5. The vast majority of burning would be on flat and gently sloping topography, and would be buffered from these streams by unburned areas that would filter potential ash and sediment (SW4 and SW5). Thinning would have little to no measurable direct and indirect effects. Channel bank integrity and woody debris in channels would be maintained by AF2 and AF3. Thinning and burning could supplement ground water storage and release water into drainages from reduction in canopy and tree density but this would be a beneficial effect. Drainages may experience increased flows during snowmelt from openings created. This effect would not be measurable as opening would be less than an acre.	Effects would be similar as in Alternative B. The additional acres of prescribed fire treatments would increase the potential for indirect impacts to fish and fish habitat. No burning would occur on steep slopes adjacent to East Clear Creek, Leonard Canyon, or Yeager Canyon, reducing the potential for sediment delivery as compared to Alt. B. The same water and soil resource protection measures would apply, minimizing adverse indirect impacts.

Cumulative Effects on Threatened and Endangered Species

Alternative A

Cumulative effects if the no action alternative was implemented, would include increased risk of high intensity fire that would result in negative impacts to the riparian areas used by the southwestern willow flycatcher. Riparian vegetation would be lost, and the flashiness of the stream system would be increased from the current condition, leading to more frequent channel scour events removing willow habitat used by the bird. There would be some improvements to riparian areas from fuel reduction and watershed improvements from the East Clear Creek Watershed Health Improvement Project, and ongoing fuel reduction from the Blue Ridge Urban Interface Project.

Cumulative effects on the bald eagle and MSO would be similar. There would be a continuing and increasing risk of catastrophic wildfires in the Victorine project area that could dramatically affect MSO and bald eagle habitat within the project area. Trees for roosting, nesting and perches could be lost from stand replacing wildfire. The MSO Recovery Plan lists wildfire as one of the major threats to the recovery of the species. Cumulatively, many MSO PACs within the watershed are currently at risk from wildfires, which would greatly decrease habitat suitability, and could potentially cause owl populations to decline. Past timber sale, thinning and fuel reduction project have treated more than 55,000 acres or about 27% of the watershed. Many of the thinning and prescribed fire treatments have lost their beneficial effects on reducing fire hazard because of time passage and the low intensity of past treatments. Past treated areas are losing their effectiveness in reducing the risk of crown fire, increasing the threats to the recovery of MSO species, and to a lesser extent the bald eagle.

Because there are no direct effects on the Chiricahua leopard frog and the Little Colorado Spinedace from the no action alternative, there would be no cumulative effects. Indirect effects from a wildfire occurring at the current conditions of high fuel hazard in the WUI would result in a adverse cumulative effect to fish and aquatic habitat in the Upper Clear Creek Watershed from increased sedimentation, high peak flows, and excessive stormwater runoff, leading to loss of riparian vegetation and other aquatic values important to both species.

Alternative B

The boundary for cumulative effects on southwestern willow flycatchers would be the Upper Clear Creek watershed boundary, and the time frame would be about 15-20 years, or possibly indefinitely. The effects of understory burning and thinning last about eight to ten years, with maintenance burning maintaining those benefits. Cumulative effects would include other projects that affect water infiltration, and soil and watershed conditions. The East Clear Creek Watershed Improvement Project combines many types of treatments, such as understory thinning, prescribed burning, channel restoration, dirt tank removal, and meadow restoration. These treatments are expected to result in overall soil and watershed improvements, through increased water infiltration, increased ground cover, and reduced soil compaction. Improvements in livestock management through implementation of the Buck Springs Range

Allotment Management Plan (2005) and the Bar T Bar Range Allotment Management Plan (2005) are also expected to result in some improvements in soil and watershed conditions. The cumulative effects from all of these projects are expected to reduce the flashiness of water flows following rain and snow events, which may allow potential habitat to mature toward suitability for the flycatchers.

Combined together, the Blue Ridge Urban Interface project, the East Clear Creek Watershed Health Improvement Project, and the Victorine WUI Project propose about 44,500 acres of prescribed burning in the 203,000-acre watershed. There would be a net loss of snags on these acres. There would be very few effects to large trees used by eagles, especially on steeper slopes which would not be burned, and which provide potential roosts during inclement weather. Increased growth rates on trees following the projects would provide for large future trees. Overall, the effects to bald eagle habitat within the watershed would be discountable.

For MSO, the cumulative effects boundary is the Upper Clear Creek Watershed, the time frame for the analysis is ten years. Within the watershed, treatments would occur in three PACs in the Victorine WUI project (110 acres of broadcast burning, 25 acres of thin and burn). The Blue Ridge Urban Interface project proposes thinning and burning treatments in one additional PAC, #040705, with 481 acres proposed for a broadcast burn. No more than 200 acres would be burned within the PAC within any year (WL 6). The Blue Ridge Urban Interface Project, the East Clear Creek Watershed Health Improvement Project and this project would go a long way in lowering the risk of wildfire in MSO PACs, and habitat areas restricted and target threshold). About 40 PACs on the Mogollon Rim Ranger District would have reduced risks of habitat destroying wildfires, including all of the PACs that are within the Upper Clear Creek Watershed.

Prescribed burning on 44,500 acres of the watershed would reduce the amount of snags and dead and down logs, which are constituent elements of critical habitat, and characteristics important to MSO habitats. This reduction would have negative impacts to MSO prey species, and indirect effects to spotted owls. The benefits of reduced threats of wildfire would outweigh these negative effects, and snags and logs would increase over time.

Cumulative effects to the Chiricahua Leopard frog and the Little Colorado spinedace are assessed for the Victorine project area. Other ongoing and future projects that may input sediment into potential habitat for leopard frogs, include livestock grazing on the Buck Springs and Bar T Bar Allotments, and fuel reduction and watershed restoration (including road stormproofing and decommissioning) activities proposed by the East Clear Creek Watershed Health Improvement project. New fences that exclude livestock from riparian streams would allow for improvements to those streams over time. Sediment would continue to be heavy in stock tanks, due to use by livestock and wildlife. As described in the *Soils* and *Water* section of this chapter, disturbances from past, ongoing and future projects in Upper Clear Creek watershed encompass less than 9% of the watershed. With implementation of resource protection measures for soils, water, aquatic habitat and fisheries, disturbances to riparian, stream and aquatic system are anticipated to be minor and not a significant cumulative effect.

Alternative C

Cumulative effects to the Chiricahua leopard frog and the Little Colorado spinedace from past, ongoing and future projects in combination with the Victorine WUI project are the same as for Alternative B.

Within the Upper Clear Creek watershed, treatments would occur in one PAC under this alternative (25 acres of thin and burn). The Blue Ridge Urban Interface project proposed thinning and burning treatments in one additional PAC, #040705, with 481 acres proposed for a broadcast burn. No more than 200 acres would be burned within the PAC within any year. Cumulative effects to snags, and logs in PACs and MSO habitat areas would be slightly less with this alternative as 110 acres would not be treated in PACs and 125 acres would not be treated in other MSO habitat areas.

Direct and Indirect Effects on Sensitive Species

Table 3-25. Summary of Direct and Indirect Effects of Alternatives A, B, and C on Forest Service Sensitive Species

Sensitive Species	Alternative A No Action	Alternative B[21] Thinning, 1,682 acres Prescribed Burning, 7,498 acres	Alternative C[22] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
Peregrine Falcon	No effects because habitat would not be altered from the current condition.	Minor short-term effects to habitat. The project area may be occasionally used by foraging peregrine falcons. There are two eyries located in the project area. One eyrie is located ½ mile from proposed treatment areas, and the second eyrie is located about two miles from proposed treatment areas. To minimize disturbance to nesting peregrines, treatments within 0.6 mile of the eyrie would occur outside the breeding season, (July 1 to February 28) (WL3). There would be some short-term indirect effects due to a decrease in snags in potential foraging habitat.	Effects are similar as Alt. B with minor short-term effects to foraging habitat over more acres. Treatments are within 0.6 and 1 mile from an eyrie. WL3 would limit disturbance to times outside the breeding season.
Northern Goshawk	No direct effects to northern goshawks. As an indirect effect, the risk of catastrophic fires would remain high in the project area, and two goshawk (post fledgling area) PFAs would be in danger of being damaged by wildland fires.	Minor short-term effects to snags and logs that would affect some prey species, while increases in openings and ground vegetation would benefit other prey species. There would be no effects to the local populations and positive effects to habitat in the long term. 26 acres would be broadcast burned within two goshawk nest stands, and measures would be taken to protect large trees through lining (WL6). Another 137 acres would be broadcast burned within one PFA outside of the nest area, while in the second PFA 106 acres would be thinned and burned, 10 acres would be thinned and chipped, and 134 acres would be broadcast burned. Direct effects to breeding goshawks through disturbance and potential loss of a nest tree, would be minimal, because project activities within the PFAs, or within ½ mile of a nest stand would take place outside of their breeding season (March 1 - September 30 period) and potential nest trees would be lined in the nest stands (WL2, WL6). Prescribed fire on 413 acres within the PFAs would result in the loss of some snags and logs, and may kill a few (0-5%) large trees in the overstory. Measures WL5, WL6 and WL8 would be taken to preserve large trees, snags and logs, though up to 20% of snags and 50% of logs	This alternative proposes 35 more acres of treatments in PFA than Alt. B. Minor short-term effects to snags and logs would be less than Alt. B because more acres would be piled and burned rather than broadcast or maintenance burned. 277 acres in PFAs would be thinned versus 116 acres in Alt. B. There would be no effects to the local populations and positive effects to habitat in the long term. 19 acres of one goshawk nest stand would be thinned and piled, and 7 acres of the other nest stand would be maintenance burned. Measures would be taken to protect large trees through lining (WL6). 137 acres would be piled and burned within one PFA outside the nest area, and 35 acres would be broadcast burned. In the other PFA, 111 acres would be thinned and burned, 10 acres would be thinned and piled, and 129 acres would be broadcast burned. The difference in this alternative is that 166 acres would be thinned and piled and burned rather than broadcast or maintenance burned. These actions would reduce the risk of high intensity fire, while retaining substantial amounts of large dead and down material that is important to prey species. The advantages of thinning and piling in this alternative are that the overstory would be protected, large trees would not be

[21] Includes 10 acres of thinning and chipping. 782 acres would be burn/thin/burn treatments; these acres are only counted once.
[22] 468 acres would be burn/thin/burn treatments and 483 acres are pile and burn.

Sensitive Species	Alternative A No Action	Alternative B[21] Thinning, 1,682 acres Prescribed Burning, 7,498 acres	Alternative C[22] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
		may be lost (Randall-Parker and Miller 1999). These changes to the habitat would likely result in short-term decreases in prey populations. Thinning from below on 116 acres of one PFA would open up the dense understory, allowing goshawks more maneuverability when foraging for prey and allowing use of areas where it is unlikely that they currently forage. Losses of snags and logs would decrease some prey populations of cavity nesting birds (woodpeckers) and mammals associated with snags and high levels of dead and down (chipmunks). Increases in ground vegetation would result in increases in other prey species, such as band-tailed pigeons, rabbits and ground squirrels. Reynolds et. al (1992) state that "though one or more prey species may undergo population fluctuations, the effects of these fluctuations are more likely to be buffered by populations of other prey species that are not simultaneously affected." Treatments in this alternative are designed to enhance and protect existing old growth, and to promote the growth of large trees over time. These actions would help protect existing goshawk habitat and promote the development of future suitable habitat. These actions would reduce the risk of high intensity fire, while retaining substantial amounts of large dead and down material that is important to prey species. Loss of logs and snags due to project activities would cause short-term decreases in some prey populations, while increases in openings and ground vegetation would benefit other prey species. The alternative would reduce the risk of wildfire in the PFAs, and would improve habitat in the long-term. There would be no change to Forest-wide population trends, because improvements in habitat in two PFAs would not influence productivity enough to affect the population.	damaged by fire, and fewer logs and snags would be consumed. Direct effects to breeding goshawks through disturbance and potential loss of a nest tree, would be minimized the same as in Alt. B with WL2 and WL6 Prescribed burning on 282 acres within PFAs would result in the loss of some snags and logs, and may kill a few (0-5%) large trees in the overstory and 20% of the snags and 50% of the logs as in Alt. B. Measures WL5, WL6 and WL8 would be taken to preserve large trees, snags and logs. Changes to the habitat would likely result in short-term decreases in some prey populations. Prey species would likely increase due to increases in ground vegetation, offsetting the decrease in woodpeckers and chipmunks. This alternative proposed thinning from below on 277 acres in the two PFAs versus 116 acres in Alt. B. This would open up the dense understory, allowing goshawks more maneuverability when foraging for prey and allowing use of areas where it is unlikely that they currently forage. Though losses of snags and logs would decrease some prey populations, increases in ground vegetation, and openings would result in increases in other prey species (Reynolds et. al 1992). Treatments in this alternative are designed to enhance and protect existing old growth, and to promote the growth of large trees over time. Thinning treatments on 1,760 acres of the project area would allow for increased growth in areas that are currently stagnant with little incremental growth. Thinning would improve VSS distribution over the long term, and goshawk habitat. The project would reduce the risk of wildfire in the PFAs, and would improve habitat in the long-term. There would be no change to Forest-wide population trends, because improvements in habitat in two PFAs would not influence productivity enough to affect the population.
Northern Leopard Frog	No effects because potential habitat would not be altered from the	Negligible impacts to potential habitat. Perennial streams located on the boundaries of the project area and contain potential habitat for this species (Leonard Canyon, East Clear Creek, Yeager Canyon). Project activity would be on ridge tops, which	The effects are the same as in Alt. B even though there would be more acres treated by thinning and prescribed fire. The same resource protection measures would minimize impacts.

Sensitive Species	Alternative A No Action	Alternative B[21] Thinning, 1,682 acres Prescribed Burning, 7,498 acres	Alternative C[22] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
	current condition.	are typically at least ½ mile from the streams. Measures SW4, SW5, SW8, AF2, and AF3 would be used to maintain the integrity of all aquatic sites, and would minimize the input of ash or sediment into the creeks and ponds. Slight amounts may enter the creeks, but would have negligible impacts to potential habitat. Stock tanks occur within the project area (12 tanks, all less than ¼ acre in size). No frogs have been detected during surveys, so it is very unlikely that there would be direct effects to the species. Due to runoff, nutrient levels in stock tanks may increase following prescribed fire, which would encourage growth of bacteria, algae, and other tadpole foods, benefiting tadpoles. However, if high levels of sediment wash into breeding pools, this could reduce oxygen levels and impact tadpoles. Measures SW4 and SW5 would minimize adverse effects to stock tanks, and sediment inputs would be negligible. Thinning dense stands and returning fire would improve watershed conditions over the long-term by increasing ground vegetation and reducing sediment movement. These conditions would improve potential habitat for the northern leopard frog in the long term.	
Arizona Southwestern Toad	No effects because potential habitat would not be altered from the current condition.	Negligible impacts to potential habitat. Effects are similar to those for the Northern Leopard frog. Perennial streams located on the boundaries of the project area contain potential habitat for this species (Leonard Canyon, East Clear Creek, Yeager Canyon). Project activity would be on ridge tops, which are typically at least ½ mile from the streams. Measures SW4, SW5, SW8, AF2, and AF3 would be used to maintain the integrity of all aquatic sites, and would minimize the input of ash or sediment into the creeks and ponds. Slight amounts may enter the creeks, but would have negligible impacts to potential habitat. Thinning dense stands and returning fire would improve watershed conditions over the long-term by increasing ground vegetation and reducing sediment movement. These conditions would improve potential habitat for the Arizona southwestern toad.	The effects are the same as in Alt. B even though there would be more acres treated by thinning and prescribed fire.

Sensitive Species	Alternative A No Action	Alternative B[21] Thinning, 1,682 acres Prescribed Burning, 7,498 acres	Alternative C[22] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
Rusby's Milkvetch	No effects because potential habitat for this species would not be disturbed.	Negligible impacts to potential populations. Although potential habitat is present on the project area for this species, this species has not been documented on the project area. If present, some individual plants may be directly affected by project activities. Measure SP1 would protect new populations found during implementation. Studies on the Peaks Ranger District indicate that this plant is fire-adapted, and has a high tolerance for disturbance (B. Phillips, pers. comm.). Fires can result in plant mortality, loss of foliage and reproduction, which is a negative effect. Fire would positively impact individual plants through increased nutrients following the burn and opening the canopy, resulting in increased vigor, growth and reproduction. Effects from thinning activities would be trampling or individual plants, loss of foliage and reproduction, and possibly increased reproduction due to disturbed soils. Since disturbance appears to stimulate this species to produce additional foliage, populations would remain stable.	Although this alternative would treat additional acres (mostly broadcast burning), effects to this species from implementing this alternative would be the same as for Alternative B.
Flagstaff Beardtongue	No effects because potential habitat for this species would not be disturbed.	Negligible impacts to potential populations. Rare plant surveys did not locate this species in the project area. Measure SP1 would protect new populations found during implementation. If present, prescribed fire could result in plant mortality, loss of foliage and reproduction. Fire would positively impact individual plants through increased nutrients following the burn and opening the canopy, resulting in increased vigor, growth and reproduction. Thinning activities could cause injury or death of individual plants due to falling trees, human activity, and equipment use where plants occur. This species appears to be fire-adapted and tolerant of disturbance. Populations would remain stable.	Although this alternative would treat additional acres (mostly broadcast burning), effects to this species from implementing this alternative would be the same as for Alternative B.
Roundtail Chub and Little Colorado sucker	No direct effects to fish and aquatic habitat. Negative indirect effects on fish and aquatic habitat could occur in the event of a stand replacing	No direct effects from prescribed fire as effects to soil are minimized by SW3. Minor negative indirect effects in the short-term from transport and/or loading of silt and ash in stream channels. 175 acres of prescribed burning on steep slopes >40% is proposed in Leonard Canyon. Wind and water could transport ash and sediment into the streamcourse. These effects would be minimized by SW4 and SW5. The vast majority of burning would be on flat and gently sloping topography, and would be buffered from these streams by unburned	Effects would be similar as in Alternative B. The additional acres of prescribed fire treatments would increase the potential for indirect impacts to fish and fish habitat. No burning would occur on steep slopes adjacent to East Clear Creek, Leonard Canyon, or Yeager Canyon, reducing the potential for indirect impacts from sediment delivery to streams. The same water and soil resource protection measures would apply, minimizing adverse indirect impacts.

Sensitive Species	Alternative A No Action	Alternative B[21] Thinning, 1,682 acres Prescribed Burning, 7,498 acres	Alternative C[22] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
	fire. Effects would include: sediment and ash flows, and potential debris torrents from stand replacing fire that could eliminate stocked spinedace and/or stocking sites.	areas that would filter potential ash and sediment (SW4 and SW5). Filter strips would lessen indirect impacts from burning on fish habitat. Thinning would have little to no measurable direct and indirect effects. Channel bank integrity and woody debris in channels would be maintained by AF2 and AF3. There would be a very slight possibility for supplemental ground water storage and release into drainages from reduction in canopy and tree density but would be a beneficial effect. Drainages may experience increased flows during snowmelt from openings created. This effect would not be measurable.	

Cumulative Effects on Sensitive Species

Alternative A

Considering other past, ongoing and future projects, if the no action alternative were implemented, there would be no added cumulative effects to the Peregrine Falcon, Northern Goshawk, Northern Leopard frogs, Arizona Southwestern toads or their existing and potential habitat. Similarly, there would be no cumulative effect to potential habitat or populations of Rusby's Milkvetch, or the Flagstaff Beardtongue. The risk of high intensity wildfires would remain high in the project area, and existing habitat in two goshawk PFAs would be in danger of being damaged by wildland fires.

Alternative B

Cumulative effects would include any other projects within one mile of the two peregrine falcon eyries in the East Clear Creek watershed. Cumulatively, this project along with the Buck Springs Range Allotment Management Project, the Victorine Wildlife Urban Interface Project, the Blue Ridge Wildlife Urban Interface Project, and past timber harvest projects would have minimal impacts to eyries. All treatments are more than one mile from the eyries. Prescribed burning occurs within one mile of one of the eyries. Though some potential nest trees could be lost through prescribed burning and thinning, the reduced threats of catastrophic fires, increases in tree growth, and reduced threats of insect epidemics would improve future nesting and foraging habitat. There would be reductions in the amount of dead and down material, and snags, which may temporarily decrease some prey populations. Less than 15% of the area within one mile of the eyrie will be prescribed burned under all projects. This leaves at least 85% of the area with no habitat changes, and no changes in prey populations. Peregrines can forage within 18 miles of the eyrie. There would be adequate prey available for the raptors and their young.

The area of consideration for cumulative effects to Northern goshawks includes the two PFAs and the surrounding Foraging Areas. Past actions within the two PFAs include the Buckhorn Timber Sale. One PFA was located in 1991, when loggers were cutting trees during the Buckhorn TS. Despite trees cut within the active nest stand, goshawks produced 2 young that year. This has been one of our most prolific breeding pairs, producing at least 13 young during 9 of the past 14 years. No activities other than the planned Victorine project have occurred, or are planned within this PFA.

Two fledglings were located in 1994 and the second PFA was designated. The fledglings and the assumed nest were on private land. Despite frequent monitoring, goshawks have only been observed near the PFA once, and no nesting has been documented. Five dwellings are located on the private property, and associated recreational activities and tree thinning occur there. No additional projects are planned within the PFA.

The area of consideration of cumulative effects to the Northern Leopard frog is the Victorine WUI project area. Other projects taking place within this perimeter that may input sediment into potential habitat for leopard frogs, include livestock and wildlife grazing on the Buck Springs and Bar T Bar Allotments. New fences that exclude livestock from riparian streams would allow for improvements and reductions of sediment inputs into those streams over time. Sediment would continue to be heavy in stock tanks, due to use by livestock and wildlife. Since the Victorine WUI project direct and indirect impacts are negligible to the frog, there would be a negligible cumulative effect.

The area of consideration of cumulative effects to the Arizona southwestern toad is the Victorine WUI project area. Other projects taking place within this perimeter that may input sediment into potential habitat for Arizona toads, include livestock and wildlife grazing on the Buck Springs Allotment. Fences that exclude livestock from riparian streams would allow for improvements and reductions of sediment inputs into those streams over time. Since the Victorine WUI project direct and indirect impacts are negligible to the toad, there would be a negligible cumulative effect.

Cumulative effects on Rusby's Milkvetch include natural fire, livestock and wild ungulate grazing, and recreation use in the project area. Wildfire would likely have much higher impacts to plants, and moderate to high intensity burning could destroy all above ground plant parts. Cumulative effects from both livestock and wild ungulate grazing include impacts on growth, vigor, structure, seed head production, reproductive processes, and survival of individual plants. Depending on the intensity of grazing, these impacts may be negligible or they may result in the loss of individual plants. Indirect effects from grazing include trampling of individual or groups of plants resulting in the injury or death of the plants trampled. In the case of this species, habitat is accessible to livestock as well as wild grazers, which puts it at a greater risk for impacts from grazing. Cumulative effects from recreational uses include the potential for trampling of individual plants and alteration in habitat for this species. Injury or death of the plant can occur as a result of camping, picnicking, or off-road vehicle use. These activities can also result in soil compaction and other changes in soil characteristics that would preclude this species from growing. This species has not been documented in the project area. Since the Victorine WUI project direct and indirect impacts are negligible to Rusby's Milkvetch, there would be a negligible cumulative effect.

Similar to Rusby's Milkvetch, cumulative effects considered for the Flagstaff Beardtongue include grazing, fire, silvicultural activities and recreational impacts. Cumulative effects from grazing include the potential for injury to individual plants. Anecdotal evidence suggests that this species is lightly grazed, but is not preferred as forage by livestock or wildlife. Light grazing has the potential to alter the growth form of individual plants and to result in the loss of flowering stalks and subsequent seed production. Prescribed fire can result in plant mortality, loss of foliage and reproduction, which is a negative effect. Fire would positively impact individual plants through increased nutrients following the burn and opening the canopy, resulting in increased

vigor, growth and reproduction. Cumulative effects from silvicultural activities would include injury or death of individual plants due to falling trees, human activity, and equipment use where plants occur. Cumulative effects from recreational use are similar to those for other plant species and include trampling of individual plants, injury or death from off-road vehicle use or other human activities, and plant or flower collection. Since this species has not been located in the project area, and the Victorine WUI project direct and indirect impacts are negligible, there would be a negligible cumulative effect.

Alternative C

The cumulative effects of the Victorine WUI project in consideration of past, ongoing and future projects would be the same to peregrine falcons, and northern goshawks, Northern Leopard frog, Arizona Southwestern toad, Rusby's Milkvetch, and the Flagstaff Beardtongue as described in Alternative B.

Direct and Indirect Effects on Management Indicator Species

The Mexican spotted owl is discussed under Threatened and Endangered Species, and the northern goshawk is discussed under Sensitive Species. Elk and turkeys are discussed under Big Game Species.

Table 3-26. Summary of Direct and Indirect Effects of Alternatives A, B, and C on Management Indicator Species

MIS Species	Alternative A No Action	Alternative B[23] Thinning,1,682 acres Prescribed Burning, 7,498 acres	Alternative C[24] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
Abert's Squirrel	No direct effects because the ponderosa pine habitat that they are highly dependant on would remain unchanged. Indirect effects would occur if stands are left untreated. The continued increase in dense stands and doghair thickets would result in declines in habitat suitability (Dodd 2003). There would be the potential for large-scale loss of habitat if, in the future, a high intensity fire occurred in this area. If a wildfire occurs, habitat suitability would decline substantially.	No direct effects in the short-term, beneficial indirect effects in the long-term. Thinning treatments would reduce the density of the young trees, resulting in a more open condition with few interlocking crowns. These squirrels are an indicator for early seral stage ponderosa pine forest, however, they have been found to associate more with mid-stage ponderosa pine (Dodd et. al 1998, Elson 1999). These stands do not currently provide habitat, and would not provide habitat in the short-term. Thinning of the early seral stage is a treatment that is recommended by Dodd (2003) to improve habitat suitability for Abert's squirrels. Increased growth on these trees would provide increases in habitat suitability over the long-term. Proposed project activities would not affect the abundance of large ponderosa pines. Prescriptions would emphasize the clumped nature of ponderosa pine, and retain clumps of interlocking crowns, which would maintain habitat suitability. Burning prescriptions would also promote openings in dense stands of young trees and improvements in habitat suitability (Dodd 2003). This alternative would not change the current stable population trend for this species.	Though this alternative treats more acres the effects of this alternative would be the same as for Alternative B. The thinning and prescribed fire would reduce crown cover on those acres improving habitat over the long-term.
Red Squirrels	No direct or indirect effects as no habitat would be affected. No effects to the current stable Forest-side population trend.	No direct effects on squirrels or their habitats because there are no treatments proposed in mixed conifer habitat, that is the desired habitat of this squirrel. An indirect positive effect would be the reduction of fire risk in areas surrounding mixed conifer stands in the steep drainages. No effects to the current stable Forest-wide population trend.	The effects are the same as in Alternative B.

[23] Includes 10 acres of thinning and chipping. 782 acres would be burn/thin/burn treatments; these acres are only counted once.
[24] 468 acres would be burn/thin/burn treatments and 483 acres are pile and burn.

MIS Species	Alternative A No Action	Alternative B[23] Thinning,1,682 acres Prescribed Burning, 7,498 acres	Alternative C[24] Thinning, 1,756 acres Prescribed burning: 8,678 acres initial treatments; 8,407 acres of maintenance burn
Pygmy Nuthatch and Hairy Woodpecker	No direct or indirect effect on these two snag-dependent species as no habitat would be altered. No effect to the current stable population trend for hairy woodpecker, and would contribute to the Forest-wide declining trend for the pygmy nuthatch.	Short-term negative effects and decline in numbers of species due to loss of snag habitat. Long-term, snags and species would rebound to current levels. Prescribed burning would decrease the amount of snags by about 15-25% in areas treated (Randall-Parker and Miller 2002), and reduce nesting substrates for these species. Fire-induced mortality in trees would partially make up this loss, but there would be a net loss of snags on the project area. Existing snags would be protected by WL 6. This alternative is designed to enhance and protect existing old growth, and to promote the growth of large trees over time, and the incidence of snags would likely increase over the long-term. Within the project area, population trends of the Pygmy Nuthatch and Hairy Woodpecker would likely decline over the short-term, rebounding to current numbers over time. No change is expected in the current stable Forest-wide trend for the hairy woodpecker, and there would be contributions to the declining trend of the pygmy nuthatch.	Effects are similar to Alt. B. Because this alternative treats more acres with prescribed fire, there would be a proportionately larger snag loss over the project area. Existing snags would be protected by WL 6. If snags are defcient in old growth stands and PACS, and sufficient trees >14" are available, new snags would be created (Table 3-21, Old Growth; Table 3-24, Mexican Spotted Owl). Effects to snags, habitat, and popultaion trends are the same as Alt. B.

Cumulative Effects on Management Indicator Species

Alternative A

On a Forest-wide scale, there would likely be no change in population trends that are currently stable for the Abert's squirrel, as ongoing or future projects such as the Blue Ridge Urban Interface Project and the East Clear Creek Watershed Health Improvement Project would improve habitat suitability while untreated dense early and mid seral stands (or areas affected by wildfire) would decline in suitability.

There would be no cumulative effects from this alternative on the Forest-wide stable population trend for Red squirrels.

As no snag habitat would be affected, the Forest-wide stable population trend for hairy woodpecker and the Forest-wide declining trend for pygmy nuthatch would not be changed.

Alternative B

This alternative would not change the stable Forest-wide population trend for the Abert's squirrel. Cumulatively, the East Clear Creek Watershed Improvement Project, the Blue Ridge Urban Interface Project, in combination with the Victorine WUI project would benefit the species by decreasing risk from catastrophic fire, increasing nutrient cycling and facilitating vigor and growth of remaining trees.

Because the Victorine WUI project would not directly impact habitat for the red squirrel, there would be no cumulative effect of the project in combination with other past, ongoing and future projects. Beneficial cumulative impacts would be gained by the project in combination with other ongoing and future fuel reduction and thinning projects by reducing the risk of wildfire in or entering mixed conifer habitat, thereby maintaining red squirrel habitat. Activities implemented in the Victorine WUI project in combination with other projects would not affect the Forest-wide stable population trend for red squirrels.

Cumulatively, the East Clear Creek project, the Blue Ridge Urban Interface Project, and the Victorine project would conduct prescribed burn on about 44,500 acres of the 203,000 acre watershed, resulting in the loss of 15-25% of the snags on project acres. Current insect outbreaks would offset the loss of snags by providing an abundant food source and create new snags. Cumulatively, these projects would contribute to the current Forest-wide decline in habitat of pygmy nuthatches, but is unlikely to change the Forest-wide stable population trend in hairy woodpecker and pygmy nuthatch (PR# SR25, SR31).

Alternative C

The cumulative effects of the Victorine WUI project in consideration of past, ongoing and future projects would be the same to Abert's squirrel and the red squirrel as Alternative B. Cumulatively, the East Clear Creek Watershed Improvement project, the Blue Ridge Urban Interface Project, and the Victorine project would burn approximately 45,200 acres of the 203,000 acre watershed, resulting in the loss of 15-25% of the snags on treatment acres. The creation of snags on roughly 5000 acres in those projects would reduce the cumulative impacts acres to about 40,000 acres. Current insect outbreaks would offset the loss of snags by providing an abundant food source and creating new snags. Cumulatively, these projects would contribute to the current Forest-wide decline in habitat of pygmy nuthatches, but is unlikely to change the Forest-wide stable population trend in hairy woodpecker and pygmy nuthatch (PR# SR25, SR31).

Recreation and Scenery Management

The *Recreation Specialists Report for the Victorine WUI*, by Jerman and updated by Gonzales, July 26, 2005 describes the affected environment relating to recreation uses, lands and special uses, wild and scenic rivers, inventoried roadless areas and visual quality of the project area, and describes the effects to these resources from the alternatives considered (PR# SR15). Effects to proposed eligible wild and scenic rivers in the project area are described in the *East Clear Creek, Leonard Canyon, Wild and Scenic River Eligibility Effects Analysis for Victorine Wildland Urban Interface Project* by Haessig, dated January 30, 2006. Data and conclusions from these reports (PR# SR15 and SR17) are incorporated by reference and summarized here.

Affected Environment

Recreation Sites/Uses

Developed Sites

There are no developed recreation sites within the project area and therefore, they will not be analyzed under the Environmental Consequences section.

Trail Systems

Trails that run through the project area include: Kinder Crossing, Horse Crossing, Macks Crossing, and Victorine Crossing. Most of these trails are historic pack trails or livestock driveways. Most of the trails are suitable for horse, hiker and mountain bike use, where motorized use is excluded (unless a portion of the trail follows an existing road).

Dispersed Recreation

Dispersed recreation is characterized by the common themes of summer activities, winter activities, consumptive use of forest resources, and educational/personal development types of activities. The area provides a moderate degree of solitude and many opportunities for picnicking and camping at user-created sites throughout the area. None

of the sites have developments other than those put there by visitors, and occupancy takes place largely on weekends during the summer and fall.

An estimated 70% of the visits to the area occur during the summer season (Memorial Day to Labor Day). It is estimated that a full 90% of the users are Arizona residents, with many users returning to their favorite sites or settings on an annual basis. Recreational activities include: hiking; viewing wildlife; dispersed car-camping; backpack camping; orienteering; horseback riding, caving, rock climbing, photography, picnicking; taking scenic drives; bicycling; shooting; and gathering in family or social groups. Off Highway Vehicle (OHV) use has increased dramatically in the last several years as neighboring Forests implement tighter restrictions on the use of jeeps, 4x4's and "quads". Family-oriented groups tend to gather at dispersed campsites, and explore from their campsite along old roads or off through the woods, making their own trails. Some areas within the project area are showing signs of use, while more fragile areas appear abused as OHV riders violate closures already in place along roads closed to vehicle use.

The local hunting seasons last from about mid-August through December and account for much of the fall use in the area. The area is part of the Arizona Game and Fish hunt "Unit 5A", and is popular for turkey, elk and deer hunting during various seasons. Tags are limited and the hunting unit is larger than the project area, so the actual numbers of hunters who use only the project area for hunting during any given season is variable and unpredictable at best.

The winter snow pack generally limits access from most recreational users from mid-December to mid-March, and snowmobile and cross-country skiing are increasing as popular uses in the area. During normal winters, snowmobiles are the only vehicles that access the area.

Gathering forest resources often combines subsistence needs with the pursuit of recreational experiences. Consumptive use within the watershed include: firewood cutting; post and pole cutting; Christmas tree cutting; collecting boughs and cones; collecting and transplanting wildlings; collecting decorative rocks (ie: sandstone, chert); fishing; hunting; gathering antlers; collecting food and medicinal resources such as berries, nuts, mushrooms, and bracken fern; and collecting biological specimens for research.

Lands and Recreation Special Uses

Recreational guides and outfitted service providers are authorized under *temporary special use permits*, on an annual basis, and currently include guided hunting, and ATV services in portions of the project area.

Wild and Scenic Rivers

East Clear Creek, and Leonard Canyon were evaluated for potential Wild and Scenic River designation in 1993. In a preliminary assessment, East Clear Creek had two outstandingly remarkable values (ORVs) identified, fisheries habitat and scenic value. The East Clear Creek segment was determined to be potentially eligible with a Scenic

classification**.** Leonard Canyon had only one single outstandingly remarkable value recognized, that being fisheries habitat. This segment was determined in the 1993 study to be eligible as Recreational classification.

East Clear Creek
This segment begins about 2 ½ miles downstream of the Blue Ridge Reservoir Dam and is free flowing to the point where it leaves the Forest. East Clear Creek (ECC) forms the northern boundary of the project area. ECC contains populations of Little Colorado spinedace. The creek has been designated as critical habitat for this species, designated threatened under both state and federal species classifications. ECC is noted for its scenic beauty. It has formed a narrow canyon with rocky cliffs and a variety of colors and textures due to the vegetative species variation and geologic formations. A total of 9,800 acres are contained within the stream corridor, of this total 4,000 acres are on the Apache-Sitgreaves National Forest, 4,100 acres are on the Coconino National Forest and 1,700 acres on private land.

Leonard Canyon
Leonard Canyon is impounded to form Knoll Lake about three miles below its headwaters. It is free flowing from below the dam to its confluence with East Clear Creek. Leonard Canyon forms the eastern boundary of the project area. The Leonard Canyon segment contains populations of the Little Colorado spinedace, a native fish classified as threatened under both State and Federal species classification. About 6,100 acres are contained within the stream corridor. Of this total, 640 acres are on private land, 2,860 acres are on the Apache-Sitgreaves National Forest and the remaining 2,600 acres are on the Coconino National Forest.

Inventoried Roadless Areas
The Victorine project area contains a portion of East Clear Creek Inventoried Roadless Areas (IRA). These areas were first delineated under the RARE II roadless area review process in the early 1980's. The East Clear Creek IRA was considered for inclusion into the Wilderness System under the Arizona Wilderness Bill in August of 1984, but was ultimately considered too small. Recently, the USDA put forward a final roadless area rule in May 2005 that invites input from state governors in the conservation and management direction for inventoried roadless areas.

Recreation Opportunity Spectrum
The Forest Plan lists the Recreation Opportunity Spectrum classes as Roaded Natural (RN) and Semi-Primitive Motorized (SPM) throughout most of the project area, with Semi-Primitive Non-Motorized (SPNM) below the canyon rims.

Visual Quality Objective
Visual Quality Objective (VQO) designations include Partial Retention along major roads and their viewsheds. A designation of Modification covers the remainder of the project area. However, SPM areas are required to have at least a Partial Retention VQO, therefore most of the planning area is in fact Partial Retention. A Partial Retention VQO

requires that management activities remain visually subordinate to the characteristic landscape.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects

Trails
Trail use is expected to remain at the low use level. Conflicts between motorized and non-motorized uses are expected to continue or accelerate. Alternative A is not expected to have any direct or indirect effects on trails within the project area.

Dispersed Recreation
Dispersed activities would continue as before, the increased pressure and degradation of riparian areas near popular dispersed camp sites may make them less desirable over time as use continues to increase. Conflicts between recreationists would continue, as off road vehicle use and extended occupancy of popular sites increases. Alternative A is not expected to have any direct or indirect effects on dispersed recreation within the project area.

Land and Recreation Special Uses
Alternative A is not expected to have any direct or indirect effects on land and recreation special uses within the project area.

Wild and Scenic Rivers
No change is expected to the ORVs in either East Clear Creek or Leonard Canyon from this alternative. Alternative A is not expected to have any direct or indirect effects on Wild and Scenic Rivers within the project area.

Inventoried Roadless Areas
Alternative A is not expected to have any direct or indirect effects on IRAs within the project area.

Recreation Opportunity Spectrum/Visual Quality Objective
ROS and VQO would remain within forest plan guidelines unless stand replacement wildfire affects a large proportion of the project area. This is particularly true in Leonard, Yeager and East Clear Creek canyons because stand-replacing fire would cause a greater decrease in VQO relative to the portions of the project area on the ridges and high drainages above the canyon. Locations and results of unplanned fire ignitions are impossible to predict however so, for the purpose of this project, Alternative A is not expected to have any direct or indirect effects on ROS or VQO in the assessment area.

Cumulative Effects
Since there are no direct or indirect effects, the implementation of Alternative A would have no cumulative effects on the recreation sites, scenic values, wild and scenic rivers, and inventoried roadless areas in the Victorine WUI project area.

Alternative B: Proposed Action

Direct and Indirect Effects

Trails
Trail use is expected to remain at the low use level. Conflicts between motorized and non-motorized uses are expected to continue or accelerate. The proposed action does not include activities adjacent to any of the trails within the project area. Alternative B would not impact existing trails in the Victorine project area.

Dispersed Recreation
Dispersed activities would continue as before, the increased pressure and degradation of riparian areas near popular dispersed camp sites may make them less desirable over time as use continues to increase. Conflicts between recreationists would continue, as off road vehicle use and extended occupancy of popular sites increases. Thinning and prescribed burning activities, occurring over time and space, would mostly go unnoticed by the recreating public. The only anticipated effect that Alternative B would have on dispersed recreation is when prescribed burning coincides with hunting seasons. Resource protection measure HS1 would minimize prescribed burning impacts to dispersed recreationists, by notifying the public prior to planned burns. Alternative B is not expected to significantly impact dispersed recreation within the Victorine project area.

Land and Recreation Special Uses
Alternative B would not impact existing land and recreation special uses in the Victorine project area.

Wild and Scenic Rivers/Inventoried Roadless Areas
There would be no changes to these areas based on the planned activities. The outstandingly remarkable values in the remote, inaccessible canyons and the "roadlessness" of these areas would not be compromised by the activities. The effects to the fisheries as described in the wildlife section, would not be significant and would not adversely affect fish and aquatic habitat. Alternative B would not impact existing Wild and Scenic River values or IRA classifications in the Victorine project area.

Recreation Opportunity Spectrum/Visual Quality Objective
The 7,508 acres of prescribed burning and thinning would eliminate many thickets of small, suppressed trees and provide a more park-like appearance to the forest. The treatments would also increase grass and forb richness and diversity after completion of proposed treatment activities. Most forest visitors prefer the park-like appearance. Thinning activities would generate accumulations of slash and prescribed burning would cause some crown scorch, temporarily reducing forest aesthetic values. Resource

protection measure VQ1, would make stumps less visible along the main roads and adjacent to developed private lands in the project area. There are no anticipated indirect effects of this alternative. Alternative B would not directly or indirectly result in a change to ROS or VQO class designations.

Cumulative Effects
Since there are no direct or indirect effects resulting from the activities of Alternative B, there would be no cumulative effects on the recreation sites and uses, wild and scenic rivers, and inventoried roadless areas in the Victorine project area.

Alternative C: Modified Proposed Action

Direct and Indirect Effects

The effects to trails, dispersed recreation, lands and recreation special uses, wild and scenic rivers and inventoried roadless areas are the same as in Alternative B.

Recreation Opportunity Spectrum/Visual Quality Objective
The 8,678 acres of prescribed burning and thinning would eliminate thickets of small, suppressed trees and provide a more park-like appearance to the forest and increase grass and forb richness and diversity after completion of proposed treatment activities. Most forest visitors prefer forests with a park-like appearance. The 8,407 acres of maintenance burning would ensure the persistence of park-like visual effects over time by limiting conifer regeneration and maintaining good forage for wildlife. First-entry thinning activities would generate accumulations of slash, and hand piles. Prescribed burning would cause some crown scorch, temporarily reducing forest aesthetic values. Resource protection measure VQ1, would make stumps less visible along the main roads and adjacent to developed private lands in the project area. There are no anticipated indirect effects of this alternative. Alternative C would not result in a change to ROS or VQO class designations within the Victorine project area.

Cumulative Effects
Since there are no direct or indirect effects resulting from the activities of Alternative B, there would be no cumulative effects on the recreation sites and uses, wild and scenic rivers, and inventoried roadless areas in the Victorine project area.

Range

The *Range and Noxious Weeds Specialists Report for the Victorine WUI* , by Gonzales, dated October 22, 2004 describes the affected environment relating to grazing areas in the project area, and describes the effects of the alternatives considered. Data and conclusions from this report (PR# SR13) are incorporated by reference and summarized here.

Affected Environment

The Victorine project area includes portions of the Buck Spring and Bar T Bar allotments. The Buckhorn Pasture (12,255 acres) of the Bar T Bar allotment is entirely within the project area boundaries. The following pastures or portions of pastures on the Buck Springs allotment within the Victorine project area total 7,652 acres: Limestone, Dines, Knolls, Moonshine, Gene's, Schneider, Lane, North Holding, North, and Steer pastures. The Dines Tank exclosure is not considered part of the Buck Springs allotment, as it was excluded from grazing specifically to protect Little Colorado spinedace and its habitat. The portion of the exclosure within the project area totals 5 acres.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects
There would be no direct effects to the existing condition of the herbaceous understory if Alternative A is selected in the sense that no direct action(s) would occur that differ from the current management activities. The future condition of herbaceous understory within the project area would be directly affected however if Alternative A is selected. Site occupancy of conifer species, primarily ponderosa pine, would increase. The anticipated increase is due to many factors. A combination of domestic and wild ungulate grazing and fire suppression activities would maintain low levels of mortality to pine seedlings due to moderated competition with browsed herbaceous plants and lack of lethal surface fires. Seedling establishment and subsequent growth within existing open herb and grass dominated openings would decrease the size of openings and decrease herbaceous understory because of shading. Increasing canopy cover within existing forested areas would limit the presence and growth of understory plants within the project area as a whole. The aforementioned factors would ultimately lead to a general decline in herbaceous understory production and a coinciding decline in grazing capacity.

There are no direct or indirect effects to fences.

Cumulative Effects
Management activities including thinning, prescribed burning, and grazing are and/or would occur on both of the allotments. Grazing management strategies are not anticipated to change within the Victorine project area. The East Clear Creek Watershed Health Improvement Project proposes to thin approximately 16 acres of ponderosa pine up to 16 inches DBH around Limestone Spring to improve water yield from the spring and thin approximately 100 acres along FR 137 to create fuelbreaks. These are the only thinning and prescribed burning activities that are within ECC project boundary that are in the Victorine project area. Some road closures may occur within the project area in the future under the ECC project. Neither the prescribed burning, thinning or future road closure

activities are anticipated to cause significant cumulative effects on herbaceous understory production within the Victorine project area.

There are no cumulative effects to the fences.

Alternative B: Proposed Action

Direct and Indirect Effects

Direct effects to the herbaceous understory are expected to result from the decrease of conifer canopy in the areas that would be thinned. The effects maintenance thin-burn and burn-thin-burn activities would result in openings that would be occupied with a diverse mix of grasses and forbs. The low intensity prescribed burning involved in these activities would maintain herbaceous understories where they are currently sufficient and increase herbaceous understories where they have been limited by conifer competition. Low intensity prescribed burning would improve herbaceous production, diversity, and nutrient content (palatability) by reducing thinning residues and naturally accumulated conifer litter and duff that inhibit seed germination and by cycling nutrients from litter and thinning residues back into the soils (Covington and Fox 1991, Moore and Deiter 1992).

Thinning and chipping would reduce conifer competition with herbs for sunlight and water resources. Thinning residue that is chipped and broadcast on site may inhibit growth of existing herbs and would likely inhibit germination of herbaceous seed by increasing the depth of the forest floor above mineral soil.

The effects of broadcast burning and maintenance burning would invigorate existing herbaceous understory. Broadcast burning in both previously treated and untreated stands would result in a minimal amount of overstory mortality, which would do little to enhance the area of dominant herbaceous understory occupation. Broadcast burning with low intensity fire would improve herbaceous production, diversity, and nutrient content (palatability) by reducing naturally accumulated conifer litter and duff that inhibit seed germination and by cycling nutrients from litter and duff back into the soils.

Direct effects to the range improvements (fences) are not expected to occur, as the fence would be protected from damage from project protection measure RM2.

There are no anticipated indirect effects to herbaceous understory or range improvements.

Cumulative Effects

Cumulative effects are expected to the herbaceous understory as other activities (fires, timber sales, thinning, prescribed fire etc.) occur on the two allotments, including the portions of the allotments that are outside the Victorine project area. Within the project area, there would be an increase in openings resulting from thinning and prescribed fire and an associated increase in herbaceous production. Prescribed burning would also act to improve herbaceous understory production and palatability. If there are no or few other activities, the herbaceous understory may be impacted, as elk from all around and within

the project area focus in on this area of new growth. Cumulative effects of this project however, are anticipated to be minimal and spread out, because the other ongoing and future foreseeable projects that improve herbaceous production in the grazing allotments and from the Blue Ridge Urban Interface, and East Clear Creek project occur outside of the Victorine project area. This would serve to distribute grazing pressure across a wider area. The time frame for cumulative effects is 10-20 years, as regeneration occurs that would displace the herbaceous understory.

There are no cumulative effects on the fences.

Alternative C: Modified Proposed Action

Direct and Indirect Effects

Direct effects are similar to Alternative B except that fewer acres are treated in the maintenance thin-burn and burn-thin-burn activities and there is thinning and piling, more acres of broadcast and maintenance burning, and there is a second entry of maintenance burning after the initial treatments.

Thinning and piling on 483 acres would reduce conifer competition with herbs for sunlight and water resources, resulting in improved understory production. Burning of thinning residue piles would cause high severity fire effects to soils located directly below the piles. These points of high severity fire effects typically inhibit native herbaceous establishment and growth and are know to provide ideal locations for invasive weed establishment if mitigation measures are not applied to rehabilitate the burn sites and limit transport of weed seeds onto the sites if seed sources are not present locally. Weed populations are rare in the Victorine project area, therefore mitigation measures preventing the transport of weed seeds from one site to another on personnel and equipment may be effective in preventing the establishment of new weed populations in high severity burn sites from pile burning.

Effects of broadcast and maintenance burning are similar except that more acres would be burned. On sites where fuels are pretreated, openings less than one-tenth acre to half acre in size may be created by fire-induced mortality. Herbaceous plants would occupy these openings because of reduced conifer competition, reduction of litter and duff, and nutrient cycling.

The maintenance thin-burn, maintenance-burn, burn-thin-burn, thin-pile, and broadcast burn treatments are all initial entry activities proposed under Alternative C. The secondary entry treatment, called maintenance burning, would reduce conifer regeneration that may occur due to seedbed preparation from previous thinning and/or burning activities. Maintenance burning would help increases in herbaceous understory production, diversity, and palatability derived from initial entry activities to persist beyond ten years.

There are no anticipated indirect effects to herbaceous understory or range improvements.

Cumulative Effects
Cumulative effects are very similar to Alternative B. The difference is that the secondary entry of maintenance burning would extend the time frame for cumulative effects of Alternative C to 20-30 years, because the maintenance burning would increase the time until conifer regeneration occurs that would displace the herbaceous understory. This would be a beneficial cumulative effect on the herbaceous understory.

There are no cumulative effects on the fences.

Invasive Plants

The *Range and Noxious Weeds Specialists Report for the Victorine WUI*, by Gonzales, dated October 22, 2004,(PR# SR13) and the *Noxious Weed and Sensitive Plant Survey Summary* by Crisp, dated August 20, 2004 (PR# SR1) describes the results of noxious weed surveys in the project area, and provides management recommendations for to reduce the risks and impacts of noxious weed invasion. Data and conclusions on the effects of the alternatives are incorporated by reference from these reports and summarized here.

Affected Environment

Noxious and Invasive Weeds
Noxious and invasive weeds are defined as "those plant species designated as Noxious and invasive weeds by the secretary of Agriculture or by the responsible State Official. Noxious and invasive weeds generally possess one or more of the following characteristics; aggressive and difficult to manage, poisonous or toxic, parasitic, a carrier or host of serious insects or disease, and being non-native or new to or not common to the United States or parts thereof." (FSM 2080).

The following analyses were consulted that considered noxious weed species over the forest and the Victorine project area: *Record of Decision Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab, and Prescott National Forests,* (USDA Forest Service, 2005); the *Coconino, Kaibab, and Prescott National Forests Noxious Weeds Strategic Plan* (Phillips et al. 1998); and *Final Environmental Impact Statement for Buck Springs Range Analysis*, (USDA Forest Service 2003); and the *Final Environmental Impact Statement for Bar T Bar and Anderson Springs Allotment Management Plan*, (USDA Forest Service, 2005).

Bull thistle (*Cirsium vulgare*) occurs in the project area with potential for increases in both population and extent. Bull thistle is usually found in disturbed sites such as roadsides, landings for logging operations, fields, and recently burned slash piles. Other noxious and invasive weeds that may occur near the project area include Russian knapweed (along Hwy 87 right of way and at Blue Ridge Reservoir), Dalmatian toadflax (Hwy 87 and FH3 right of way), and camelthorn (private land in subdivision).

Cheatgrass (*Bromus tectorum*) is common along Forest roads in and adjacent to the project area.

A Noxious Weed Risk Assessment was previously prepared for a project that overlaid a portion of the Victorine project area (Crisp, 1999). A risk rating of "Moderate" resulted from the Risk Assessment. Actions that should occur as a result of the Moderate Risk Rating are:

- Develop preventative management measures for the proposed project (Victorine WUI) to reduce the risk of introduction or spread of noxious weeds into the area.
- Preventative management measures should include modifying the project to occupy disturbed sites with desirable species.
- Monitor area for at least 3 consecutive years and provide control of newly established populations of noxious weeds and follow-up treatment for previously treated infestations.

These actions have been incorporated into the project resources protection measures of NW1 – NW5 and into the project specific monitoring plan for the project detailed in the Monitoring section of Chapter 2.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects

No vegetative treatments or prescribed burns would occur within the project area and no other actions are proposed. As a result, there would be no direct or indirect effects resulting from vegetative treatments or prescribed burns if this Alternative was implemented.

Cumulative Effects

Noxious and invasive weeds would continue to expand their range even if silvicultural treatments or prescribed burns were not implemented.

Livestock and wild ungulates would continue to graze across the entire project area in this Alternative. In addition, the timing and duration of wild ungulate grazing differs from that of livestock. Wild ungulates typically are present on the allotments much earlier and also later than the typical grazing season for livestock, and in fact, depending on the weather, may be present all year long on at least a portion of these allotments. This means that there is a greater opportunity for disturbance, caused by wild ungulates, possibly creating sites for noxious and invasive weeds. The acres within the project area, that are available only to wildlife, also provide a greater opportunity for disturbance, possibly creating sites for noxious and invasive weeds.

Noxious and invasive weeds are expected to continue to increase in highway right-of-ways, landings, and other disturbed areas impacted by other forest users not associated

with this project (recreationists, primarily, such as hunters, horn gatherers, sight-seers, bird and wildlife watchers, etc). These forest users create disturbed sites, such as dispersed camping areas and new vehicle tracks across the landscape.

The net effect of all these activities may result in an increase in noxious and invasive weed acres, even though no vegetative treatments or prescribed burns would occur.

Alternative B: Proposed Action

Direct and Indirect Effects
The potential for direct and indirect effects from implementation of Alternative B on noxious weed invasion is high where vegetation treatments and prescribed burns are proposed, especially due to the close proximity of known populations of noxious and invasive weeds. Any ground disturbance has the potential to provide the opportunity for noxious and invasive weeds to become established. As soil disturbance increases, the risk of noxious weed establishment increases. The project would minimize disturbance to the extent feasible (NW4) Depending on the level of ground disturbance, the vegetation treatments and prescribed burns have the potential to provide a means of establishment for noxious and invasive weeds. Heavy equipment has the potential to disturb soils and to provide a seedbed. Protection measures such as equipment cleaning clauses in contracts, (NW2), removal of weed sources (NW1), and revegetation of surface disturbed areas (NW3) would minimize the potential for weed establishment and spread.

Burning provides a seedbed for establishment of noxious and invasive weeds. Vehicles and equipment used in burning operations also have the potential to introduce and disperse seeds. Equipment cleaning would minimize this impact (NW2).

Seeding can also introduce noxious and invasive weeds. If some method of scarification is used, such as "hoof action" or mechanical equipment, the potential for weed establishment can be high. If seeding is done without scarification, this potential is reduced. The source of the seed used should also be considered. Weed-free seed sources would be used to minimize the potential for establishment of noxious and invasive weeds in seeded areas (NW5).

Cumulative Effects

Cumulative effects from the vegetative treatments and the prescribed burns would be the same as described for Alternative A.

Alternative C: Modified Proposed Action

Direct and Indirect Effects
The potential for direct and indirect effects from implementation of Alternative C is the same as described in Alternative B

Cumulative Effects
Cumulative effects from the vegetative treatments and the prescribed burns would be the same as described for Alternative B.

Heritage Resources

The *Heritage Resources Specialist's Report for the Victorine Wildland Urban Interface Project*, by Martine, dated October 22, 2004, describes the findings of the heritage resource survey of the project area, and provides management recommendations to reduce the risks to known and potential heritage resource sites. Data and conclusions on the effects of the alternatives are incorporated by reference from this report (PR# SR11) and are summarized here.

Affected Environment

The Victorine Urban Interface analysis area contains a variety of non-renewable historic and prehistoric archaeological sites that reflect past land uses.

Archaeological evidence indicates that prehistoric use was focused on seasonal hunting, gathering, and food processing activities. Potential water sources in the area, such as precipitation run-off and springs, probably attracted game and supported a diverse vegetative community, in turn attracting prehistoric people to the area to exploit these subsistence resources. Known prehistoric sites within the project area consist of limited-activity lithic scatters, probably representing temporary camps. These sites probably range from Archaic to Proto-historic in age.

The Victorine project area is located at a relatively high elevation, and contains a limited number of historic archaeological sites. This includes one-room cabins, a few homesteads, and lithic scatters.

The Victorine project area may have been traditionally used by many Native American tribes, and the area has potential for contemporary use (Crossley 2001).

Approximately 16% (2880 acres) of the Victorine project area has been intensively surveyed. A total of five sites have been recorded within the Victorine Urban Interface Area. The previous surveys verify the Forest Land Management Planning Site Density Prediction Model projection of a low site density (0-9 sites per square mile) in all areas of the project.

The latest Forest Service listings for the National Register of Historic Places have been consulted, and no sites on or nominated to the Register are known to be in the project area. In accordance with 36-CFR-800.4(c), all five sites appear to be potentially eligible for nomination to the National Register of Historic Places under Criterion D of 36-CFR-60.4 and would be considered eligible for Section 106 purposes for this project. Cultural

resources specialists have inspected each known site within the project area and have verified that each site is marked for avoidance, following protection measure HR1.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects
If the No Action Alternative is implemented, the only likely natural disturbance to sites would occur during a wildfire. The nature and severity of fire effects to archaeological sites is difficult to predict and is dependant upon the variables of fire intensity, duration, and heat penetration into the soil. The fire intensities predicted under the No Action Alternative have the potential to destroy surface components of historic sites containing wood, as well as metal and glass artifacts. Direct effects would include loss of surface features or architectural components, and the consequent loss of scientific information. Effects to prehistoric sites would include burning of surface artifacts and alteration or destruction of their dating potential (and associated loss of scientific information). Effects to structural components such as rock walls or rock faces include discoloration, cracking, and spalling, making the rocks susceptible to accelerated deterioration. Implementing the No Action Alternative could also result in severe post-fire erosion and damage to the sites from burned trees falling onto sites. Erosion effects the spatial distribution of cultural materials on the surface of a site and alters the information potential. In addition, structural loss or damage can result from severe erosion episodes. Potential fire intensities predicted for the area have the potential to alter or destroy plant populations in the area that are utilized by Native Americans.

Cumulative Effects
Cumulatively, the No Action alternative could result in conditions that adversely affect the integrity of historic and pre-historic sites within the project area. Potential for damage resulting from wildfires would increase with time as forest fuels accumulate, decreasing the ability of firefighters to safely protect highly flammable sites such as historic cabins. Erosion and tree-fall resulting from severe fires would ultimately compromise the integrity of known and unknown sites.

Alternative B: Proposed Action

Direct and Indirect Effects
Potential direct effects to sites in the project area include ground disturbance and subsequent displacement of artifacts as a result of mechanized thinning and piling, and chipping slash. Burning slash and broadcast burning natural fuels could also have the direct affect of destroying combustible elements of historic sites such as wood cabins, features, and artifacts. Such disturbance could have the indirect affect of diminishing the research potential of unprotected sites in the project area. The archaeological clearance document for this project specifies that non-ground disturbing treatments that would

contribute to the accomplishment of project objectives may be allowed within archaeological sites (HR2). Ground disturbing treatments and pile burning may not take place within known sites, and historic sites must be avoided during broadcast burns. This would result in the project having no adverse effect on sites in the project area (HR3 and HR4). Furthermore, reducing fuel loads using methods that are non-ground disturbing on and around archaeological sites are effective for reducing the severity of potential wildfire damage to these non-renewable resources. Consultations with tribes resulted in no specific concerns about the effects of the proposed treatment activities. No known Traditional Cultural Properties or traditional use areas are known in the project area. Tribal access would not be affected by the proposed project.

The activities described in the Proposed Action, in conjunction with the appropriate mitigations, (HR1 - HR4) would not detrimentally effect cultural resources, and could result in a beneficial effect on the cultural resources by reducing the potential effects of wildfire.

Cumulative Effects
The cumulative effects on cultural resources of this project in combination with other past, ongoing and future foreseeable actions are minor in scope as they have be minimized and mitigated by the same resource protection measures as all other projects. The treatments prescribed in the Cultural Resources clearance report and project resource protection measures mitigate any of the project's potential adverse effects.

Alternative C: Modified Proposed Action

Direct and Indirect Effects
The direct and indirect effects of Alternative C are the same as those described for Alternative B. The activities described in the Modified Proposed Action, in conjunction with the appropriate resource protection measures as described in Chapter 2, HR1 – HR4, would not detrimentally affect cultural resources, and could result in a beneficial effect on the cultural resources by reducing the potential effects of wildfire.

Cumulative Effects
The cumulative effects on cultural resources for this project are the same as those described in Alternative B. The treatments prescribed in the Cultural Resources clearance report along with the project resource protection measures mitigate any of the project's potential adverse effects.

Air Quality

The *Fire, Fuels, and Air quality Report for the Victorine Wildland Urban Interface Project*, by Jerman, dated October 19, 2004, describes the conclusions of the air quality assessment for the project area, and provides management recommendations to reduce impacts from the project on air quality. Data on the affected environment and conclusions

on the effects of the alternatives are incorporated by reference from this report (PR# SR5) and are summarized here.

Affected Environment

The project area is located within the Little Colorado River airshed. Prevailing southwest winds and the topographical nature of the project area typically cause smoke from prescribed burns in this area to carry north and east further into the Little Colorado airshed and away from communities and non-attainment areas located in the Verde River airshed to the south.

Environmental Consequences

Alternative A: No Action

Direct and Indirect Effects
There would be no direct changes in short-term or long-term affects to air quality as a result of a No Action alternative. However, this alternative does increase the long-term potential for a high intensity surface fire in the existing high intensity burn areas within the project area. This alternative also increases the long-term potential for crown-replacing wildfire in the low and moderate intensity burn areas within the project area. Both types of fire would generate considerable amounts of smoke and airborne particulates, but these wildfires generally occur during unstable atmospheric conditions when optimal smoke dispersal conditions exist.

Cumulative Effects
Ongoing and future projects in the Victorine project area and within the Upper Clear Creek watershed that would impact air quality include other prescribed burning treatments of natural and activity-generated fuels. There would be no cumulative impact from the Victorine WUI project if the No Action alternative were implemented.

Action Alternatives B and C: Proposed Action and Modified Proposed Action

Direct and Indirect Effects
Because the effects of both prescribed broadcast and pile burning on air quality are similar to one another and similar between Alternatives B and C they would be discussed together here as one effects analysis.

Broadcast and/or pile burning would generate smoke and airborne particles, decreasing air quality on a *short-term* basis but would not exceed air quality standards. Some of these impacts can be reduced through standard smoke management practices (AQ1 and AQ2 in Chapter 2). By timing and scheduling the burn to be completed during periods of favorable atmospheric conditions. Impacts would be greatest on the day of ignition with

decreasing impacts lasting 2-4 days following a single days ignition, and up to 1-2 weeks following multiple day ignitions.

Much of the smoke that is generated by broadcast burning in the Victorine project area would pass over East Clear Creek during the daytime with winds that are predominately out of the southwest. Nighttime flows of smoke are usually downhill, down stream into East Clear Creek. This would result in potentially heavy concentrations of smoke at the bottom of East Clear Creek with moderate to light concentrations at higher elevations. Residents in the Blue Ridge area north of the project area may receive some nighttime smoke impacts. By conducting ignitions during the early portion of the day, nighttime smoke impacts of burning are minimized (AQ2). This provides maximum consumption time and smoke dispersion before nighttime inversions develop. Public notification through various media and personal communication would be conducted prior to burning to allow smoke sensitive individuals the opportunity to take any necessary precautions (HW1 and HS2).

Cumulative Effects
Cumulative effects of smoke from prescribe burning would be short-term, but would increase in magnitude as the number of treatment acres increase for any given day of ignitions or multiple days of ignitions. These impacts can also be magnified by emissions from prescribed burning on adjacent areas including the Apache-Sitgreaves N.F., Tonto N.F., Fort Apache Reservation, state lands, private property and other project areas on the Coconino N.F. Approval for daily prescribed burning activities must be requested from and approved by the Arizona Department of Environmental Quality (ADEQ) (AQ1). The ADEQ would approve the requested acreage, reduce the approved acreage from that requested, or not approve prescribed burning depending upon a variety of factors including cumulative effects of smoke emissions from multiple jurisdictions thereby mitigating most of the potential for severe smoke impacts to the entire Little Colorado Airshed. Cumulative effects of this project in combination with other ongoing or future foreseeable projects involving prescribed burning would be minor in scope because it would be unusual to have multiple burns going on at the same time on the Mogollon Rim District. If this did occur, the multiple burns would be regulated by the ADEQ to minimize overall smoke impacts.

Economic Analysis

The *Economic Analysis for the Victorine Wildland Urban Interface Project* by Koyiyumptewa, dated July 19, 2004 describes the conclusions of the market and non-market costs and benefits of the alternatives considered. Data from the analysis and the effects of the alternatives are incorporated by reference from this report (PR# SR3, SR2) and are summarized here.

Quantifiable factors, such as economic costs and benefits were used to describe some of the economic effects from the thinning and prescribed burning activities proposed by the project. An economic simulation model called *QuickSilver* was used to calculate the

estimated economic costs and benefits for the action alternatives (USDA 1999). The estimates are based on a variety of quantitative assumptions, including actual current values. If the benefits could not be quantified for each activity, a narrative description of the non market value for each activity is presented. The estimated costs and benefits used are based on a variety of assumptions that may change over time. Ten years was used as the analysis period. The projections displayed in Table 3-27 below best serve as an indicator of change rather than precise measurement. A summary list of the methods, values, units and investment periods used for the analysis is provided in the *Economic Analysis* report that is found in the project record.

Enivonmental Consequences

Table 3-27. Economic Benefits and Costs of Alternatives A, B and C for the Victorine WUI Project for the 10-Year Period.

	Forest Service Costs* **		
	Alternative A	**Alternative B**	**Alternative C**
Benefit/Cost Ratio	NA	0	0
Present Net Value	NA	-$1,616,812	-$2,591.877
Present Value Benefits	NA	$2,457	$3,030
Present Value Cost	NA	-$1,619,269	-$2,594,907

* Discount Rate %: 4.00

** The Forest Service would incur the costs of maintenance thin/burn, maintenance burn, broadcast burn, burn/thin/burn, thin/chip, thin/pile, and maintenance, wildlife surveys and monitoring, pretreatment and post treatments monitoring activities. The Forest Service is required to fund the project through allocated funds, cost share or grants.

Alternative A - No Action Alternative

Under this alternative there are no economic benefits or economic gains for the public and the Forest Service. Under this alternative, the Forest Service incurs no costs, as no activities would take place. Market and non-market outputs (benefits) described in the action alternatives (Alternative B and Alternative C) would not be realized if this alternative is implemented. This alternative does not meet the primary purpose and need nor does it meet the sole objective of reducing high intensity fire risk in the urban interface community and developed private property within the project area. There would be no impacts to air quality, and negative impacts to public health from smoke and visibility are not affected. There would be no risk of loss of private property values from prescribed fire. However, impacts would occur if a high intensity wildfire occurred in the project area. The more than 1,600[25] homes in the Blue Ridge WUI would be at risk of total loss and the non-market value of the ponderosa pine ecosystem would be a loss as well.

[25] Values based on a property survey in January 2003 (Atchison, pers. Comm 2004).

Alternative B - Proposed Action Alternative

Under this alternative economic gains or benefits realized for the Forest Service for this 10-year period are very minimal ($2,457). However, under this alternative, costs ($1,616,812) incurred by the Forest Service are out weighed by the non-market outputs. The following describes the market and non-market public benefits that would be realized if this alternative is implemented:

1. A market benefit from understory thinning (ladder fuels reduction) and prescribed burning (ground fuels reduction) would benefit the developed private lands in the Victorine WUI and the Blue Ridge WUI to the northeast. The market value is the number of developed private properties (10 private properties in Victorine WUI) and residential houses (1,600 homes) in the Blue Ridge WUI that are considered safer from high intensity wildfires. It is estimated that approximately 1,600 homes with an average value of $237,500[26] per home would be a lot safer from the threat of a high intensity wildfire if this alternative were implemented. This alternative meets the primary purpose and need and the objective of reducing high intensity fire risk to the Victorine WUI.

2. A non-market benefit of moving the project area toward a sustainable and healthy ecosystem would be realized from the understory thinning if Alternative B is implemented. This alternative would thin about 1,608 acres that would maintain a healthy and sustainable ecosystem that is diverse and productive and in the long-term (ten years +), and may increase the total value of marketed outputs and non-marketed outputs (USDA Forest Service and Natural Resource Conservation Service 1994).

3. A non-market benefit of protecting nearly 900 acres of forest health investment projects (previous precommercial thinning and aspen exclosures) would be realized that would allow the area to move toward a sustainable and healthy ecosystem.

4. A non-market benefit of growing large diameter trees faster would be realized from the understory thinning if this alternative is implemented. This would benefit old-growth dependent wildlife species, especially endangered, threatened and sensitive wildlife species.

5. A non-market benefit of creating structural diversity would be realized from the understory thinning if this alternative were implemented. This would benefit several wildlife species.

6. A non-market benefit of providing fuel wood (3,354 cords) to the public from the understory thinning material if this alternative is implemented. If market for the small diameter products (understory thinning material) were realized, net revenue of $2,457 to the Forest Service would be realized.

[26] Based on a January 2003 survey (Atchison pers. comm. 2004).

7. Under this alternative, smoke emissions are lower by about 200 tons of particulate matter than Alternative C. This amount of smoke emissions over a ten-year period is insignificant.

Alternative C -- Modified Proposed Action

Under this alternative economic gains or benefits realized for the Forest Service for this 10 year period are very minimal ($3,030). In this alternative, costs ($2,594,907) incurred by the Forest Service are out weighed by the non-market outputs. The market and non-market public benefits that would be realized if this alternative is implemented are greater than Alternative B because more acres are treated by thinning and prescribed burning. There would be greater safety from wildfire risk to the two WUI communities, and there would be greater benefits to the ecosystem, previous forest health investments, wildlife including TES species, and more fuel wood produced. Smoke emissions are higher in Alternative C by 200 tons of particulate matter than Alternative B. This amount of smoke emissions over a ten-year period is insignificant. Alternative C offers more flexibility in controlling timing and duration of smoke because more acres are proposed for pile burning that could occur in the off-season limiting impacts to the public and residents. In addition, Alternative C proposes to maintenance burning on 8,407 acres 3 to 12 years after the completion of all treatment activities. This would reduce high intensity wildfire risk to the two WUI communities longer than Alternative B.

Environmental Justice

The Forest Service examined the social, economic, and environmental impacts of this project and determined that none of the alternatives considered in this analysis would have a disproportionate impact on any minority or low-income population in the immediate area, within the surrounding counties, or in the Northern Arizona region. The overall economy of the Coconino, Navajo, and Gila County area is diverse, including its low income and minority populations. The economy is strongly tied to the tourism industry and associated commerce and service industries. The forest products industry is a much smaller component of the economy. Implementation of fuel reduction treatments in Alternative B and C would realize indirect benefits to the local economy from jobs and employment. As stated in the Economic Analysis above, market benefits would be realized to the private lands and landowners by treating hazardous fuel accumulations in the Victorine WUI project area. Other non-market benefits to the forest health and structure would be realized as well. The project would have low potential exposures to environmental human health hazards, namely particulates from prescribed burning. This would be minimized by utilizing standard smoke management practices during prescribed burns. Exposure to hazardous components in smoke from prescribed burning would be much less than that from wildfire.

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

Jason Jerman, ID Team Leader, District Fire Ecologist
Bruce Koyiyumptewa, District Silviculturist
Doug Spaeth, District Wildlife Biologist
Cathy Taylor, District Wildlife Biologist
Dick Fleishman, District Soil and Watershed Staff
Dan Derrick, District Timber Staff
Peter Pilles, Forest Archaeologist
Kristen Martine, District Archaeologist
Trish Callaghan, District Recreation Staff
Jerry Gonzales, District Range Staff
Ed Freed, District Engineer
Carol Holland, District Planning Staff
Laura Moser, Forest Botanist
Deb Crisp, Forest Botany Staff
Mike Manthei, Forest Silviculturist
Carl Beyerhelm, GIS Support
Kathryn Farr, Forest Planning Staff
Polly Haessig, District Planning Staff
Cavetta Green, Wildlife Biologist, Peaks/Mormon Lake District

FEDERAL, STATE, AND LOCAL AGENCIES

US Fish and Wildlife Service
USDA Natural Resource Conservation Service
Arizona Game and Fish Department

TRIBES

Hopi Tribe
Yavapai-Prescott Tribes

RESPONDED DURING SCOPING

Harold and Judith Belsher, Scottsdale, AZ
Brian Belsher, Scottsdale, AZ
Charles Bly, Happy Jack, AZ
Richard and Eleanor Borg, Black Canyon City, AZ
Stephen Bowman, Scottsdale
Ken Clay, Winslow, AZ
Donald Cox, Peoria, AZ
Ray and Kathy Duncan, Mesa, AZ
Timothy Durkin, Happy Jack, AZ
Wade Finch, Eagar, AZ
Mark Fitch and Peter Lahm, Arizona Department of Environmental Quality, Air Quality

Division
Harold L. Green, Happy Jack, AZ
Larry Hammond, Phoenix, AZ
Ira Haydon, Phoenix, AZ
Stephen Hickman, Phoenix, AZ
Robinson Honani, Hopi Tribe, Kykotsmovi, AZ
Eric and Amy Hood, Happy Jack, AZ
Lou Hoover, Happy Jack, AZ
Mr. and Mrs. Lee Jones, Payson, AZ
Robert and Allison Klein, Tempe, AZ
Lally McMahon, Forest Guardians, Sante Fe, NM
Dr. Alvin Medina, Flagstaff, AZ
Loyd Myers, Happy Jack, AZ
Glenn Myers, Phoenix, AZ
Donald Prior, Scottsdale, AZ
Bob and Judy Prosser, Winslow, AZ
Patricia Raygor, Winslow, AZ
Donald Schaeffer, Happy Jack, AZ
James Schuttenberg, Scottsdale, AZ
Brian Segee, Center for Biological Diversity, Tucson, AZ
John B. Smith, Heber, AZ
Randy Smith, Arizona Game and Fish Department, Flagstaff, AZ
Ed W. Smith, Flagstaff, AZ
Jim Sprinkle, Payson, AZ
Don Stillwell, Phoenix, AZ
Bill Volk, Blue Ridge Fire Department, Happy Jack, AZ
Wayland Wilford, Scottsdale, AZ
Robert Witzeman, Maricopa Audubon Society, Phoenix, AZ

APPENDIX A: SCOPING COMMENTS AND DISPOSITION

A scoping letter, dated September 19, 2000 was sent to more than 500 local residents, state and federal agencies, native American tribes, and other organizations. Responses were received from 63 individuals. Of these, 24 individuals made no comments and 23 of these requested to remain on the mailing list to obtain further information about the project. Comments from 38 individuals listed below were numbered for tracking.

2	Harold and Judith Belsher, Scottsdale, AZ
3	Brian Belsher, Scottsdale, AZ
5	Charles Bly, Happy Jack, AZ
6	Richard and Eleanor Borg, Black Canyon City, AZ
7	Stephen Bowman, Scottsdale
9	Ken Clay, Winslow, AZ
10	Donald Cox, Peoria, AZ
14	Ray and Kathy Duncan, Mesa, AZ
15	Timothy Durkin, Happy Jack, AZ
17	Wade Finch, Eagar, AZ
18, 35	Mark Fitch and Peter Lahm, Arizona Department of Environmental Quality, Air Quality Division
20	Harold L. Green, Happy Jack, AZ
23	Larry Hammond, Phoenix, AZ
24	Ira Haydon, Phoenix, AZ
25	Stephen Hickman, Phoenix, AZ
26	Robinson Honani, Hopi Tribe, Kykotsmovi, AZ
27	Eric and Amy Hood, Happy Jack, AZ
28	Lou Hoover, Happy Jack, AZ
30	Mr. and Mrs. Lee Jones, Payson, AZ
33	Robert and Allison Klein, Tempe, AZ
37	Lally McMahon, Forest Guardians, Sante Fe, NM
38	Dr. Alvin Medina, Flagstaff, AZ
39	Loyd Myers, Happy Jack, AZ
40	Glenn Myers, Phoenix, AZ
42	Donald Prior, Scottsdale, AZ
43	Bob and Judy Prosser, Winslow, AZ
44	Patricia Raygor, Winslow, AZ
46	Donald Schaeffer, Happy Jack, AZ
48	James Schuttenberg, Scottsdale, AZ
49	Brian Segee, Center for Biological Diversity, Tucson, AZ
50	John B. Smith, Heber, AZ
51	Randy Smith, Arizona Game and Fish Department, Flagstaff, AZ
52	Ed W. Smith, Flagstaff, AZ
53	Jim Sprinkle, Payson, AZ
54	Don Stillwell, Phoenix, AZ
57	Bill Volk, Blue Ridge Fire Department, Happy Jack, AZ
58	Wayland Wilford, Scottsdale, AZ
59	Robert Witzeman, Maricopa Audubon Society, Phoenix, AZ

The following table shows how each comment was handled as part of the planning process. The first column includes the comments made. Many comments are paraphrased and similar comments are combined. Letter numbers are as listed above. The third column shows the response to each comment. Issues are identified. Issues are points of discussion, dispute or debate about the proposed action. Issue statements are presented. Issues are categorized as non-significant for this proposal. No significant issues were identified from the public scoping comments. Non-significant issues are discussed briefly in Chapter 1. Other

comments are categorized as alternatives, concerns that appropriate procedures be followed and other concerns.

Table B-1 Scoping Comments and Disposition		
Comment	**Letter #**	**Disposition**
Project must comply with the Clean Air Act, protection of visibility in Class I areas, National Ambient Air Quality Standards, and Arizona Rule R18-2-15. The project should analyze effects to the Payson Non-Attainment area.	18, 35	**Non-significant Issue.** Air Quality Issue. *Smoke from prescribed fires can impact visibility in Class I Wilderness, exceed air quality standards, impact adjacent areas in Non-Attainment status, and negatively impact human health.* The Clean Air Act and state air quality regulations decided this. Burning would only occur when permitted by the ADEQ to minimize effects on human health and the environment. Smoke management practices would be incorporated to minimize effects and comply with law. Refer to Chapter 2 Resource Protection Measures for Alternatives, and Chapter 3 Air Quality.
Concerned about smoke impacts especially smoke incursions during the nighttime.	20, 25, 27	**Non-significant Issue.** Air Quality Issue. *Smoke from prescribed fires can impact visibility in Class I Wilderness, exceed air quality standards, impact adjacent areas in Non-Attainment status, and negatively impact human health.* The Federal Clean Air Act and state air quality regulations decided this. Burning would only occur when permitted by the Arizona Dept. of Environmental Quality to minimize effects on human health and the environment. Smoke management practices would be incorporated to minimize effects and comply with law. Notifying private landowners and local communities through the media, personal communication, or by signing is a standard operating procedure prior to conducting prescribed fire. Refer to Chapter 2 Resource Protection Measures for Alternatives.
Concerns over visual impacts of thinning.	33	**Non-significant Issue.** Visual Quality Issue. *Fuel treatment activities such as thinning, piling and burning, and prescribed fire will alter the naturally appearing characters of the forested landscape.* This has been decided by land allocations in the Forest Plan. Refer to resource protection measures for visual quality in Chapter 2, and Chapter 3, Recreation and Scenery Management for a discussion of effects.
Concerns over the adverse economic effects of commercial logging. Concerns over the damage and loss of ecosystem service values associated with logging intact forest ecosystems. Requested a no harvest, restoration only alternative.	37	**Non-Significant Issue:** Socio-economic Issue: *Project activities may cause adverse socio-economic effects and loss of ecosystem service values due to commercial logging.* The alternatives propose thinning of understory trees up to 12 inches in DBH to reduce fuels and restore forest health. If the market for small diameter wood products improves, then there would be a small market benefit from thinning under the action alternatives. Fuel wood may be provided to the public from the understory thinning material. The forest ecosystem would remain intact and would have an improved resiliency to wildfire, thereby enhancing ecosystem service values. A market benefit from understory thinning (ladder fuels reduction) and prescribed burning (ground fuels reduction) would benefit the Victorine and the Blue Ridge WUI and developed private lands because fire risk would be reduced. Because the Action Alternatives are consistent with the Forest Plan and would move towards the desired condition of the forest, their implementation would also contribute towards the maximization of net public benefit. Refer to Purpose and Need in Chapter 1, and Alternatives in Chapter 2. The economic analysis of the alternatives is found in Chapter 3 -- Economics.

Table B-1 Scoping Comments and Disposition		
Comment	**Letter #**	**Disposition**
Concern about reduction in snags and down wood from prescribed fire effects in areas that are deficit or below standards and guidelines already. Suggests falling 12-14 inch trees for down wood after last burning.	51	**Non-significant issue:** Snag and Down Wood issue: *Project activities may cause a loss of snags and down wood from the forest ecosystem.* This was decided by the Forest Plan Standards and Guidelines, which were designed to provide adequate snags and large down wood for species habitat needs and soil productivity, without increasing fuel loading to an unacceptable level. Snags are generally lower than Forest Plan standards and guidelines in the project area. There would be some loss of snags from prescribed burning, (about 15-25% of large snags >16"DBH could be lost per acre treated) but new snags would be recruited as trees die from initial and maintenance burning. Snags in critical wildlife areas would be protected from fire effects by lining. Over the long term, with application of prescribed fire, snags would be increased trending toward Forest Plan standards and guidelines. The project area currently contains on average 4 to 5 logs per acre, which is greater than the 2 or more recommended in the Forest Plan. Downed logs per acre would also be reduced by 30 to 50% from prescribed burning. Logs per acre would remain about 4 per acre on 12,400 acres and would decrease to 1-2 per acre on 7,000 acres. Project-wide, logs would remain at or above Forest Plan standards and guidelines. New downed logs would be recruited as tree boles die and fall down after prescribed burning. The "*Wildlife Specialist's Report for the Victorine WUI Project*" by Taylor, dated May 29, 2005 provides support for these conclusions, and describes the direct, indirect and cumulative effects of the alternatives on snags and downed wood. Protection measures to retain logs and snags on the landscape during thinning and prescribed burning are also described. Refer to Chapter 3 -- Wildlife.
Emissions of each alternative need to be quantified, including comparison to potential wildfire emissions. Include BMPs for smoke management and alternatives to burning for each alternative.	18, 35	**Procedural Concern.** Refer to Air Quality section in Chapter 3, to the Fire Fuels and Air Quality Specialist Report, and to Chapter 2, Resource Protection Measures for Alternatives.
Supports forest thinning and prescribed fire/burning as described in the proposed action.	5, 6, 10, 17, 24, 25, 28, 30, 42, 44, 50, 52,53, 58	**Alternatives B and C.** Thank You for your input.
Fire hazard was increased from past logging and thinning when slash was not treated and piles were not burned.	7	**Alternatives B and C.** Slash from thinning in this project would be treated by a variety of treatments: chipping, piling and burning, and prescribed burning. Alternatives B and C.
Opposed to prescribed burning in the Victorine area because of the risk of fires burning out of control and potential forest and property loss. Alternatives to burning should be used to manage the forest and reduce fuels.	14	**Alternatives A, B and C.** The prescribed burns proposed by the project would be low intensity burns with burn blocks adjacent to roads. This allows for better control of prescribed burns. Alternative B proposes 10 acres of thinning and chipping immediately adjacent to developed private land which would not involve any burning. Alternative C proposes thinning and hand piling and burning of slash on 483 acres immediately adjacent to developed private land, sensitive habitat areas, and in areas of very high fuel loading. Pile burning has a low risk of escape onto private property. Alternative A is no action.

Table B-1 Scoping Comments and Disposition		
Comment	**Letter #**	**Disposition**
Utilize spring burning to promote ceanothus germination.	9	**Alternatives B and C.** Burning would be conducted in the spring and fall or at other times of the year when weather and fuel conditions are in prescription and are favorable. Refer to Chapter 3 -- Vegetation.
Concerned about prescribed fire control and escape and ensuing property loss.	14, 15, 39, 42, 44, 46 48, 54, 57, 58	**Alternatives B and C.** The prescribed burns proposed by the project would be low intensity burns with burn blocks adjacent to roads. This allows for better control of prescribed burns. Alternative B proposes 10 acres of thinning and chipping immediately adjacent to developed private land which would not involve any burning. Alternative C proposes thinning and hand piling and burning of slash on 483 acres immediately adjacent to developed private land, sensitive habitat areas, and in areas of very high fuel loading. Pile burning has a low risk of escape onto private property. The Coconino Forest has a good track record for completing prescribed burning according to prescription.
Suggests a 24-hour fire watch for prescribed burns in Blocks 20-29 due to prevailing winds.	57	**Alternatives B and C.** Monitoring of prescribed fires would occur day and night at established lookout locations on the District, such as Moqui Lookout. Prescribed burning would only occur when permitted by the local air pollution control district to minimize effects on human health and the environment. Burns would be ignited only under appropriate weather and wind conditions and ignitions would be halted when conditions go out of prescription. Refer to resource protection measures for fire/fuels in Chapter 2 for monitoring of prescribed fires.
Opposed to the project. The risk of wildfire is over exaggerated and primarily due to past logging activities. They have no faith in Forest Service prescribed fire management to overturn the many years of fire suppression.	27	**Alternatives A, B, and C.** How the Alternatives respond to the Purpose and Need of the project is described in Chapter 2 Comparison of Alternatives. The risks of wildfire from fire suppression are presented in the National Fire Plan and related documents. Three 2002 fires clearly documented that fire intensity and rates of spread were reduced when confronted with areas that had been previously treated. The Springer Fire on the Coconino National Forest in Arizona (May 14, 2002), and the Bucktail Fire in western Montrose County of Colorado (May 23, 2002) were burning with high intensities and rates of spread http://www.fireplan.gov/overview/fuels_reduction2002.htm. These fires changed behavior when they ran into areas that have been recently treated in fuels reduction projects that included thinning and prescribed fire. The Cone Fire which burned in the Blacks Mountain Research Area on the Lassen National Forest in September 2002 showed almost 100% mortality in untreated areas, considerable tree mortality in areas thinned but not prescribed burned, and only some scorching on trees on the edge of stands thinned and underburned (Skinner et al. in press; Nakamura 2002).
Supports prescribed burning in riparian meadows to promote plant growth and reduce exotic weed competition.	38	**Alternatives B and C.** There are no large riparian meadows in the project area. The streamcourses and riparian areas associated with streams would be buffered and prescribed fire would not be lit within the buffers. Prescribed fire would be allowed to creep or back down into riparian areas.
Supports fire woodcutting and logging.	40	**Alternatives B and C.** If the market for small diameter wood products improves, then there could be some commercial logging from the project from the understory thinning. Fuel wood may be made available to the public from the understory thinning material.

Table B-1 Scoping Comments and Disposition		
Comment	**Letter #**	**Disposition**
Supports the 12-inch cap on understory thinning.	49	**Alternatives B and C.** Refer to Chapter 2. Thank you for your input.
Supports a 9-inch cap on understory thinning. Cutting larger diameter trees removes lower risk trees and removes future wildlife habitat.	59	**Alternatives B and C.** Trees that would be thinned would range up to 12 inches DBH, but the majority of the trees cut would be in the <1" to 9" DBH range. This best meets the purpose and need of the project. Refer to Chapter 3 -- Vegetation.
Supports thinning and fuel reduction of smaller diameter fuels, while retaining larger diameter fuels.	51	**Alternatives B and C.** Refer to Chapter 2.Thank you for your input.
Defer from burning block 29 north of Morgan Tank.	51	**Alternatives A, B and C.** Refer to Chapter 2. Block 29 south of Morgan Tank is proposed for broadcast and maintenance burning between the 137E and 137B roads in Alternative B and C and would be deferred in Alternative A. No action is proposed to the north of the tank.
Suggests monitoring Burn/Thin/Burn blocks to see if they meet thermal cover standards and guidelines.	51	**Alternatives B and C.** Refer to Chapter 2 -- Monitoring.
Supports fuel reduction through commercial logging if economically feasible.	53	**Alternatives B and C.** If the market for small diameter wood products improves, then there could be some commercial logging from the project from the understory thinning. Refer to Chapter 2, and Chapter 3 -- Economics.
Fire-proofing remote landscapes outside of WUI areas is not cost effective and does not benefit the forest.	59	**Alternatives B and C.** Fuel reduction treatments are proposed within the WUI and adjacent areas that are at risk to stand-replacing crown fires that could threaten life and property, given the prevailing wind direction from the SW. Fuel reduction treatments are not meant to “fire proof” remote landscapes; that is not the intent of these treatments. We will never be able to “fire proof” the forest. By the very nature of these treatments, we can only expect to make areas “fire resistant” to intense stand replacement fires that threaten life and property. The Mogollon Rim has the lowest cost/acre for fuels reduction treatments on the Coconino National Forest. It is well known in scientific literature that the cool fires, which periodically burned on the average of 5-7 years in the Ponderosa pine type, were and are very beneficial to the ecosystem. It is the very destructive stand replacement fires that do the most long-term ecological damage.
Requests notification of thinning and burning in Block 7 (Limestone Canyon, Section 17,) or in the project area.	2, 3, 7, 25, 42	**Other Concern.** Notifying private landowners and local communities through the media, personal communication, or by signing along roads is a standard operating procedure prior to conducting and during prescribed fire. The District would be glad to notify adjacent landowners when thinning would be conducted.

Table B-1 Scoping Comments and Disposition		
Comment	**Letter #**	**Disposition**
Past forest thinning in project vicinity cut too many trees. The thinning was too heavy. More thinning is not needed.	7, 33	**Other Concern.** Past pre-commercial thinning in the project areas cut ponderosa pine trees that were 5" in DBH and less to a 12' X 12' spacing. This left 302 residual trees per acre, which is far greater than our current stocking guideline of 125 trees per acre. High spacing of residual trees results in competition for soil nutrients, soil moisture and sunlight that ultimately impacts forest health, vigor and tree growth.
Opposed to prescribed burning over so many acres and the danger presented to wildlife.	23	**Other Concern.** The prescribed burns proposed by the project would be low intensity burns with burn blocks adjacent to roads to allow for better control of the prescribed fire, and to lessen impacts to wildlife and habitat. Prescribed burning in a burn block would occur from 50 to several hundred acres in a day and/or over a short period of days; burning would not occur over the entire project area at one time, but would be scheduled through the burning season as weather and fuel conditions allow. Refer to Chapter 3 -- Wildlife for discussions on effects to wildlife.
Concerned about potential forest and trail closures during prescribed fires.	25	**Other Concern.** The forest is not normally closed during prescribed burning, and the public is notified about prescribed burns through the media, personal communication, or by signing along roads.
Concerned about effects of the project on Clear Creek Units # 8 & 9, and how much burning would occur adjacent to the property.	46	**Other Concern.** The nearest prescribed burning proposed in the action alternatives is two miles to the south of Clear Creek Units 8 & 9. Refer to Chapter 3 -- Fire and Fuels, and Air Quality for discussions of effects of the project that could impact developed property within the Blue Ridge WUI. No fuels treatments are proposed next to CCP Units 8 & 9.
Desires that the Forest Service insure private property in case the prescribed burn gets out of control and burns into private land areas.	7	**Out of Scope.** The Forest Service does not assume any liability for property damage from conducting prescribed burning. The Coconino Forest has a good track record for completing prescribed burning according to prescription. Insurance to private landowners is not a decision to be made in this EA.
Supports more cattle grazing.	40	**Out of Scope.** The purpose of the project is to reduce crown fire hazard in the Victorine WUI. Alternatives to reduce fuels include understory thinning, prescribed burning, and chipping treatments.
Supports the use of local labor to thin the small diameter trees. Opportunities for partnerships should be explored for implementation.	52, 59	**Out of Scope.** Methods of project implementation have not been finalized. The type of contract, agreement, or work crews used would be the ones that best meet each project objective, combined with Federal Acquisition Regulations, and funding available for implementation, and is not part of the decision to be made on this EA.

Table B-1 Scoping Comments and Disposition		
Comment	**Letter #**	**Disposition**
Assert that all cattle grazing should cease in treated areas, permanently. This would protect endangered fish as well. Cites articles that indicates that cattle induce "doghair" trees. Overgrazing is the first cause of destructive fires.	59	**Out of Scope.** Cattle grazing or restricting cattle grazing is not proposed in any of the alternatives and is outside the scope of this proposal.
All had no comments. All except for one want to continue to be informed about the project.	24 individuals	Thank you for responding to initial scoping.

APPENDIX B: SPECIALIST REPORTS INCORPORATED BY REFERENCE INTO THE EA

The key documents listed in alphabetical order below by title are incorporated into this environmental assessment by reference. These documents reside in the Project Record and can be obtained from the Mogollon Rim Ranger District Office located at the Blue Ridge Ranger Station at Happy Jack, Arizona.

Analysis of Effects of Fuels Reduction Prescriptions on Selected Aquatic Resources by Taylor, (June 2005). This report described the affected environment of fish in the project area and larger watershed, and the effects of the alternatives considered in the analysis. (PR# SR7)

Biological Assessment and Evaluation: Sensitive Species, Victorine Wildland Urban Interface Project, by Cavetta Green (February, 2006). This report documents effects to sensitive species in the analysis area. (PR# SR29)

Economic Analysis for the Victorine Wildland Urban Interface Project Area, by Koyiyumptewa, (July 2004). This report documents the methods and results of the economic analysis conducted for the project, and compares the economic benefits of the alternatives. (PR# SR3)

Final Biological Assessment and Evaluation to Threatened and Endangered Species, Victorine Wildland Urban Interface Project by Spaeth, (November 2004), approved by Taylor, (June 2005), updated by McGuinn, (August 2005). This BAE documents the evaluation of threatened, proposed, petitioned and sensitive wildlife and fish species in compliance with the Federal Threatened and Endangered Species Act. (PR# SR26)

Fire, Fuels, and Air Quality Report, Victorine Wildland Urban Interface by Jerman, (October 2004). This report describes the affected environment for fuels, fire, and air quality, and analyzes the effects of the alternatives on fuels, fire and air quality. (PR# SR5)

Heritage Resources Specialist's Report, by Martine, (October 2004). This report describes heritage resources in the project area, and analyzes the effects of the alternatives on these resources. (PR# SR11)

Noxious Weed and Sensitive Plant Survey Summary, Victorine Fuels Reduction Project, by Crisp, (August 2004). This report documents survey findings for noxious weeds and sensitive plants in the project area, and provides management suggestions to apply to the project to reduce impacts. (PR# SR1)

Range and Noxious Weeds Specialist's Report, Victorine Wildland Urban Interface, by Gonzales, (October 2004). This report describes range conditions, and noxious weed occurrence in the project area, and analyzes effects of the alternatives on both range and noxious weeds. (PR# SR13)

Recreation Specialist's Report Victorine Wildland Urban Interface, by Jerman, (May 2004), revised by Gonzales, (July 2005). This report describes the existing conditions of the recreation resource, wild and scenic rivers, and roadless areas, and analyzes the effects of the alternatives on the three resources. (PR#SR15)

Soil and Water Specialist's Report, Victorine Wildland Urban Interface Project, by Fleishman, (March 2004). This reports documents the existing conditions for soil and water in the project area, and describes the effects of the alternatives on the two resources. (PR# SR19)

Vegetation Analysis for the Victorine Wildland Urban Interface Project, by Koyiyumptewa, (October 2004). This report documents the stand conditions and the effects of the alternatives. (PR# SR20)

Wildlife Specialist's Report, Victorine Wildland Urban Interface Project by Taylor, (May 2005). This report describes the affected environment for wildlife species of concern in the project area, and analyzes effects of the alternatives on them. (PR# SR25)

APPENDIX C: LITERATURE CITED

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APPENDIX D: RESPONSES TO COMMENTS ON THE EA

Eight comments on the Victorine Wildland Urban Interface (WUI) project were received during the public comment period on the EA, July 26, 2005 to August 26, 2005. Comments were received from the following individuals and organizations:

1. Mr. Harold Belsher, Scottsdale, AZ
2. Mr. Chuck Bly, Happy Jack, AZ
3. Mr. Stephan J. Bowman, Scottsdale, AZ
4. Mrs. Kathryn A. Myers, Happy Jack, AZ
5. Mrs. Judy Prosser, Winslow, AZ
6. Mr. Erik Ryberg, Center for Biological Diversity, Tucson, AZ
7. Mr. And Mrs. Douglas and Debra Wood, Scottsdale, AZ
8. Mr. Leo Zabella, Fountain Hills, AZ

Phone Conversation #1, Mr. Harold Belsher

Comment 1-1: *I favor Alternative C as described in the EA.*

Response 1-2: Thank you for your comment of support of the project.

Phone Conversation #2, Mr. Chuck Bly:

Comment #2-1: *I support Alternative C because it treats more acres with thinning. I have been in the project area and see a great need for tree thinning, and opening up of the stands. I would also like to see more treatments that would benefit or restore aspen trees, which are declining in the area.*

Response 2-1: Thank you for your comment of support for the project. The East Clear Creek Watershed Health Improvement Project proposes some treatment of upland areas that may benefit aspen and other trees.

Letter #3, Mr. Stephan J. Bowman

Comment 3-1: *Thinning over the past 10-15 years has occurred next to the roads where it is the most visible. I would prefer that the thinning would not be allowed within 100 yards of the major roads i.e.: 95, 96, 137, 565A, etc. The area around roads 137 and 565A still looks like a desert compared to before the thinning.*

Response 3-1: The proposed thinning treatments along the aforementioned roads in the comment include: maintenance thinning followed by prescribed burning of stands that have been previously thinned; burn, thin, burn of previously untreated stands; and thinning and piling in areas next to developed private lands, in sensitive wildlife habitat or where there are very high existing fuel loadings (EA p. 18 – 21).

Maintenance thinning is needed in previously treated stands in order to maintain or reduce the crown fire hazard to a low level in these stands. It is important to maintain ground fuel

loads and ladder fuels to low levels along roads because experience and history reveals that human-caused fire ignitions are more frequent close to roads. In the event of a wildfire, it is critical to have low fuel loads along roads to provide for safer public and firefighter access and egress from the area. Roads in this project also are a critical component to controlling prescribed burns and maintenance burning. Existing roads can be excellent control points for prescribed burning only if fuel loads are low along them.

Along many roads, small diameter trees have grown in thickly, reducing sight distance and impairing public safety especially along road turns. This situation may not be the case for FR137 and the 565A road, but the situation exists on other road segments in the project area.

The thinning prescription along the roads would be a variable spacing thinning with stands left more open near the roads and feathering back to more dense conditions. The clumpy nature of pine stands would be retained as would interlocking crowns for trees that are 12 inches in diameter or greater (WL9, EA p. 24).

As a standard practice, stumps would be cut to 6 inches in height or less, or 4 inches from an obstacle such as a rock within 50 feet of FS road 96 and 137 south of the junction with FS road 96 to the southern project boundary. Similarly, stumps would be cut 6" or lower within 100 feet from developed private lands. This measure is primarily to reduce visual impacts of the thinning as seen from roads (VQ1, EA p. 23). The Visual Quality Objective of Partial Retention would be met along major roads and their viewsheds, whereby management activities would remain visually subordinate to the characteristic landscape (EA p. 107). The thinning and prescribed burning would eliminate many thickets of small, suppressed trees and once completed the forest would appear more open and park-like. The treatments would also increase grass and forb richness and diversity (EA p. 107).

Comment 3-2: *Neither the contractor nor the Forest Service burned the stacked slash after the thinning. To this day there are still big piles of stacked debris along 565A and some on 137.*

Response 3-2: Slash piles were intentionally left unburned from the last thinning entry to provide for wildlife habitat in these areas. One to two piles were to be left per acre, but field reconnaissance indicates that there are many partially burned slash piles (40-605 consumed) and a few unburned slash piles. The interdisciplinary team has reviewed the situation and has determined that the unburned slash piles are serving some utility for wildlife (PR# IDT-52, 53). The unburned slash piles that occur with designated treatment units in the Victorine WUI project would not be directly ignited during prescribed burning. Prescribed fire would be allowed to progress around the existing slash pile remnants and unburned slash piles according to prescription to achieve fuels treatment objectives and maintain control of prescribed fire. Over time with continued maintenance burning, the slash piles would gradually decay or be consumed by fire. This would improve the visual conditions and overall aesthetic impact of the area as well as reduce concentrated fuels.

Comment 3-3: *The roads were graded for the contractor's benefit. This was not done with any road longevity in mind so where we had a pretty good pack and surface on 565A it was*

graded and removed. Now with the past 10 years of rain and snow, the road is 10 times worse off than it would have been had they left it alone with a good hard pack on the top. Additionally when grading, they created new drainage paths which did not turn out to be where nature wanted them to be so we have a major rutty mess out there primarily 565A but partially on 137.

Response 3-3: While we recognize the need of citizens to have improved road access to their private properties, that need is beyond the Forest Service's legal authority to meet. The National Forest road system is authorized under the National Forest Roads and Trails Act of 1964. The law authorizes roads and trails "for intensive use, protection, development, and management of National Forest lands" (16 USC 532). The law makes no provision for meeting any other public transportation purpose. The Forest's responsibility for road maintenance on FR 137 and FR 565A roads is limited by available funding. The District can put these roads into an annual Forest road maintenance schedule. All Forest roads however are prioritized for annual maintenance based on their maintenance needs, public and administrative use, watershed impacts, and total funding available. The maintenance level of the FR 137 road is Level 3, which has a goal of maintaining safe travel by a standard passenger vehicle. FR 565A is designated a Level 2 road for which the goal is to maintain safe travel by a pick-up truck or other high clearance vehicle, and to maintain drainage conditions that are not causing resource damage. As a private landowner, you can share in the responsibility of road maintenance by entering into a cost collection agreement with the Forest Service whereby needed maintenance could be carried out, such as road grading, blading or other road re-conditioning by you according to Forest Service specifications. This would necessitate obtaining a Special Use Agreement with the Forest. Private landowners or other heavy users of Forest roads often enter into these agreements. Because the Victorine WUI project proposes only minimal uses of the road to conduct non-commercial thinning and prescribed burning, the only road maintenance anticipated is that which is needed to conduct project activities and repair existing road drainage and rutting problems that you noted.

Letter #4, Mrs. Kathryn A. Myers

Comment 4-1: *I do comprehend the need for the Victorine Wildland Urban Interface Project. We need it accomplished on several levels of protection i.e., forest, wildlife flora, humans and housing. My greatest concern, because of this being our residence and our sons's year-round residence, is that you use the most safe and prudent methods and procedures so as not to endanger our homes. We could never recover from such a catastrophe.*

Response 4-1: Alternatives B and C incorporate resource protection measure FF2 (EA p. 23). Evening and early morning fire patrols and lookout staff would be utilized during prescribed burns to check on burn status and weather conditions to minimize the risk of escaped fire in the event of a significant weather change. Alternatives B and C propose treatments to minimize risks to developed private lands. The prescribed burns proposed by the project would be low intensity burns with burn blocks adjacent to roads. This allows for better control of prescribed burns. Alternative B proposes 10 acres of thinning and chipping immediately adjacent to developed private land which would not involve any burning.

Alternative C proposes thinning and hand piling and burning of slash on 483 acres immediately adjacent to developed private land, sensitive habitat areas, and in areas of very high fuel loading. Pile burning has a low risk of escape onto private property.

Prescribed burning would only occur when permitted by the Arizona Department of Environmental Quality to minimize effects on human health and the environment. Burns would be ignited only under appropriate weather and wind conditions and ignitions would be halted when conditions go out of prescription (EA p. 126-127). The Coconino Forest and the Mogollon Rim Ranger District has a good track record for completing prescribed burning according to prescription (EA p. 127).

Letter # 5, Judy Prosser

Comment 5-1: *Bob and I are in support of Alternative C. It is our belief also that this area, along with most of our allotment could use some major thinning of small diameter trees. Why are you not continuing the treatment northward into Sections 16, 17, 10 and why not more of Section 22?*

Response 5-1: The planning process for this project has been ongoing since 2000 when the proposed action was developed and public scoping occurred. No treatments were proposed in Sections 10, 16 and 17. In Section 22, only initial broadcast and maintenance burning is proposed in Alternative C in ponderosa pine stands south of Morgan Tank. In addition to considering the need for fuel treatments and thinning to reduce the risk of crown fire in these four sections, the Interdisciplinary Team also considered factors of: feasibility of implementation; positive and negative impacts to various resources; and the risks of habitat loss from thinning or prescribed burning treatments. Some of the general reasons why no treatments were proposed in these sections have to do with wildlife concerns in Protected Activity Centers (PACS) of the Mexican spotted owl, sedimentation and increased erosion rates following prescribed fire that could affect habitat for the threatened Little Colorado spinedace, elevated risks of prescribed fire escape near steep drainages in East Clear Creek and its tributaries, the vegetation and soil types of the areas, and a lower need for fuel treatment in these areas. These conditions and concerns are more specifically described below.

- Five Protected Activity Centers (PACS) are contained in or within one half mile of Sections 10, 16, 17 and 22. The PACs are in the steeper canyons and tributary drainages of East Clear Creek, and Leonard Canyon. In 1997, an analysis of what PACs on the District were at most risk to wildfire was done and two PACs were rated as high risk, and the other three, moderate risk. However, all but one PAC, (Macks Crossing) was rated as low prescribed burning feasibility. Roads are used as control points for prescribed fire, and because there are no roads located on the edge of the East Clear Creek Canyon, dozer lines would need to be constructed there to contain and control prescribed fires. This was felt to be too great an impact to soils, water quality and wildlife habitat. Fire occurrence is low to moderate in the PACs, and the feasibility for mechanical treatments ranges from low to high. Feasibility is higher on the ridge tops where slope gradients are gentler and there are roads. Potential prescribed burning at Macks Crossing was evaluated but it was dropped from further

analysis because it was felt to be too risky due to the steep slopes of East Clear Creek and the presence of an occupied nest site. The Recovery Plan for the Mexican spotted owl allows for timber thinning treatments in 10% of the PACs. The ID team determined that priorities for treatments within PACs and goshawk territories should occur in areas with heavy fuel loading adjacent to private lands or around recreational use areas to reduce the threat of human-caused fires. To meet these criteria, burning and thinning treatments were proposed adjacent to 10 PACs and within one PAC in Leonard Canyon. These treatment areas are to the south of sections 16 and 17 and in the west part of section 22.

- Fuels in the northern portion of the project area in which these sections occur generally fall into one of two categories: (1) steep slopes with heavy continuous fuels in the canyons and drainages (MSO habitat) and (2) and variety of slopes with discontinuous fuels derived from scattered ponderosa pine, pinyon-juniper and/or Gambel oak with lots of mineral soil and rock in the surface fuel profile. These areas were not considered for thinning and prescribed fire due to limited feasibility, consistency with the Forest Plan (slopes greater than 40% are restricted from mechanical harvest), and lower fire risk in the scattered ponderosa, pinyon-juniper and Gambel oak stands. The location of existing roads on the ridge tops in these sections would also make prescribed fire control more difficult. Dozer lines would have to be constructed as control points to contain the fire spread before it entered the steeper drainages of East Clear Creek and Leonard Canyon. Dozer lines and prescribed fire entering the drainages would have negative impact to soils, and could increase surface erosion which would impair water quality and habitat for the Little Colorado spinedace.
- Private lands in Section 9 and 15 are undeveloped and were considered a lower priority for treatment in the WUI.
- The shallow sandy soils that are present in the northern part of the project area were a concern because prescribed fire would reduce soil cover, and erosion rates could be accelerated, impacting the water quality of East Clear Creek and Leonard Canyon and their tributaries.

Letter # 6, Erik Ryberg, Center for Biological Diversity

Comment 6-1: *We support the efforts to reduce fuels in the Victorine WUI project because it limits logging to trees under sixteen inches diameter at breast height.*

Response 6-1: Thank you for your comment supporting the project.

Letter #7, Douglas and Debra Wood

Comment 7-1: *We as property owners in the area fully endorse any means of reducing fuel loads in the local forests to help prevent wildfires. We fully endorse either action Alternative B or C – whichever would benefit the proposed areas the most for future fire control and promote healthy forest conditions.*

Response 7-1: Thank you for your comment supporting the project.

Personal Communication #8, Leo Zabella

Comment 8-1: *I support Alternative C because it treats the most acres most effectively for the long term.*

Response 8-1: Thank you for your comment supporting the project.