



United States Department of Agriculture
Forest Service

Southwestern Region
Apache-Sitgreaves
National Forests

Environmental Assessment Larson Forest Restoration Project

**Black Mesa Ranger District,
Apache-Sitgreaves National Forests**

Coconino and Navajo Counties, Arizona



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Chapter 1 – Introduction

This environmental assessment (EA) complies with the requirements of the National Environmental Policy Act (NEPA) of 1969, Federal Regulations found in 40 Code of Federal Regulations (CFR), Chapter V, and the 36 CFR 218 objection regulations. This document summarizes environmental effects of the proposed action. The project is proposed on National Forest System lands within the Black Mesa Ranger District of the Apache-Sitgreaves National Forest (ASNFs).

This project is authorized under the objection process for Non-Healthy Forest Restoration (HFRA) projects and will therefore be subject to the objection procedure at 36 CFR 218, in lieu of the appeal procedure at 36 CFR 215. This process encourages early and continued public participation in the planning process prior to the decision being made.

This is not a decision document. Instead, it presents evidence and analysis necessary to determine whether the consequences of the proposed action and alternatives have “significant” effects on the human environment and therefore, whether an Environmental Impact Statement (EIS) is necessary. Upon determination, the Responsible Official, Forest Supervisor, would make a decision to implement the proposed action, an alternative, or a modification, which would include design criteria for implementation. A project record containing documentation to support the findings in this document is located at the District office in Overgaard, Arizona.

Location

The project area is located on the southern edge of the Colorado Plateau along the Mogollon Rim, adjacent to the community of Forest Lakes, Arizona. The project is bounded on the north by Chevelon canyon, to the south is Forest Lakes estates and highway 260, Smith Ridge Rd (FSR 178) is the eastern boundary. Legal descriptions include the following (Map 2):

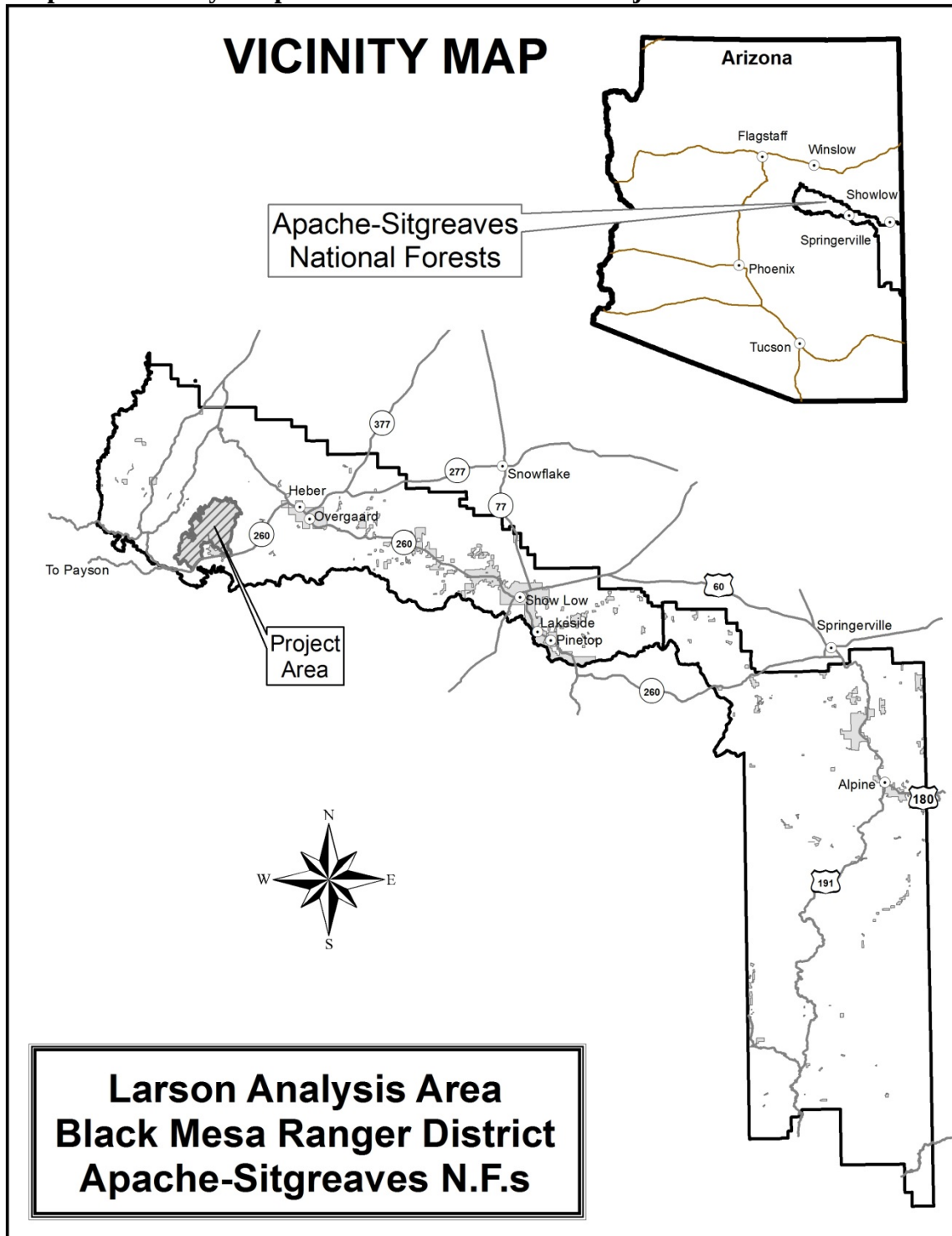
T11N, R13.5E, Sec. 13 & 24
T11N, R14E, Sec. 1-13, 15-22, 28-30, and 33
T11N, R15E, Sec. 5-8, and 17-20
T12N, R14E, Sec. 1, 11-16, 21-29, and 31-36
T12N, R15E, Sec. 5-9, 15-22, and 28-30

Background

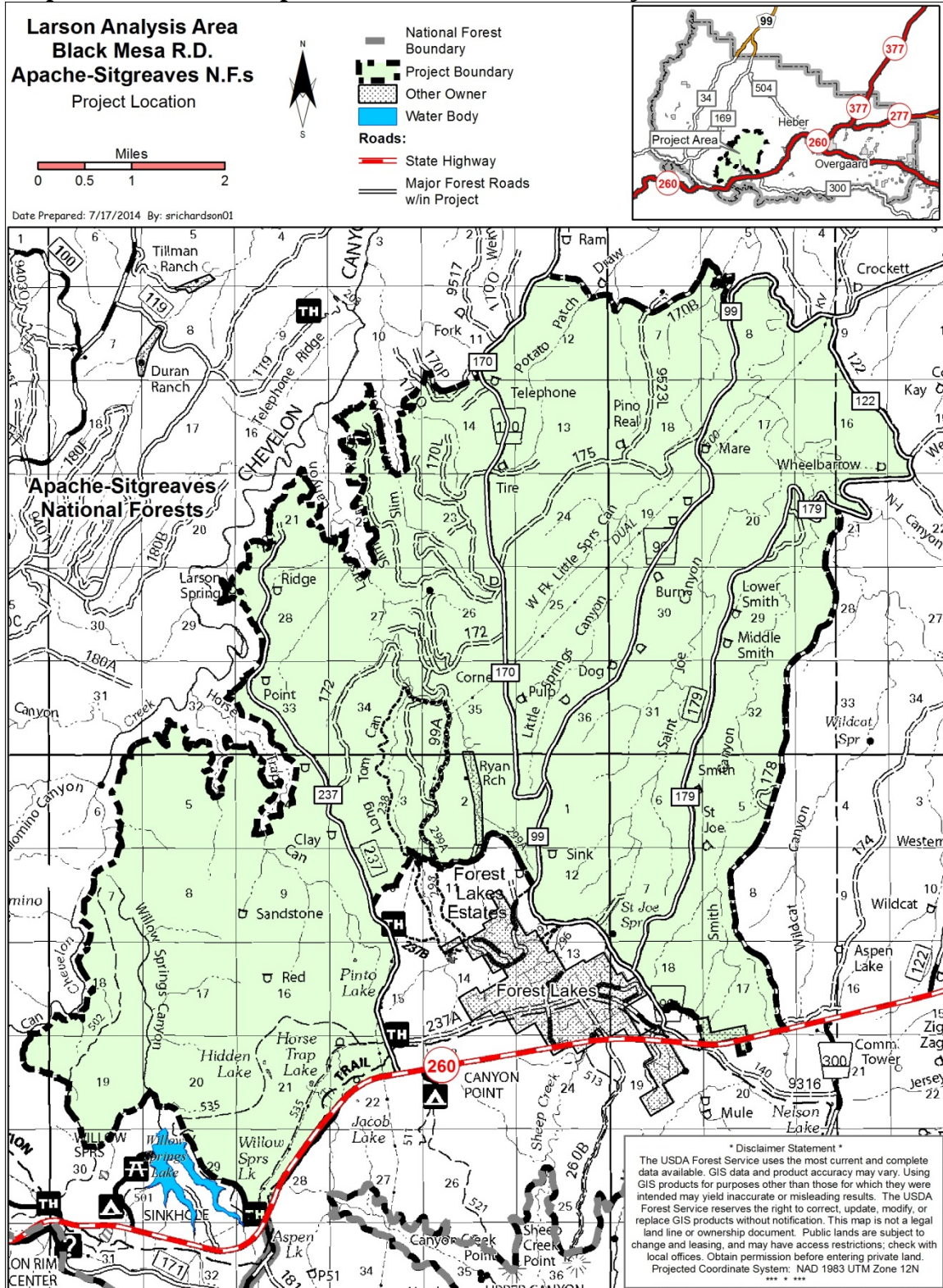
The vegetation communities in the area are comprised mostly of ponderosa pine with small pockets of aspen, Gambel oak, and components of dry mixed conifer. There is indication of past forest management practices in part of these units with several units exhibiting evidence of two or more entries. Previous treatments appear to consist of thinning, timber harvest, and prescribed burning.

The Larson project area is part of a frequent fire ecological system where surface fire burned across the entire landscape on a frequent (1 – 10) year interval. These fires resulted in a more open landscape, with groups of trees surrounded by openings containing grasses, forbs, and shrubs. The overly-dense forests in the Larson project area are currently at risk to high severity, stand-replacing wildfire as a result of the increased tree densities. Additionally, forest stand conditions have decreased resilience to insect and disease outbreaks.

Map 1 – Vicinity Map – Larson Restoration Project



Map 2 – Location Map – Larson Restoration Project



Existing Condition

The Larson project area ranges in elevation from approximately 7,821 feet in the south along Larson Ridge to approx. 6,500 feet in the north in Wildcat Canyon. Average annual precipitation ranges from approximately 37 inches at the higher elevations to 30 inches at the lowest elevations. Vegetation types range from mixed conifer to ponderosa pine forest.

The Larson project area consists of dense stands of ponderosa pine, with tree densities ranging between 250 and 2,500 trees per acre. Historical data collected in the analysis area suggest that historical densities ranged from 30 to 40 trees per acre (Sensibaugh, 2013). Within the dry mixed conifer stands there is a shift toward more shade tolerant species within the younger trees and regeneration. The most noticeable condition of the project area is the current tree density, which, in conjunction with the associated increased fuel loading, represents ecosystem health concerns and vulnerability to drought, severe insect outbreaks and severe, high intensity crown fire.

The forest cover types found in the Larson project area include ponderosa pine, southwestern white pine, Douglas-fir, white fir, aspen, and oak woodland. Heavy ungulate browsing is occurring throughout the area on Douglas-fir, white fir, Gambol oak, and aspen. Conifer regeneration has also been impacted by heavy ungulate browsing. Bark beetle hazard is moderate to high over much of the analysis area, and would increase as these stands become denser. The area also faces considerable dwarf mistletoe infections, which are known to kill large diameter conifers.

Fire Managers are concerned that the area is in high risk of losing much of its value due to wildfire. The Mogollon Rim in general is highly susceptible to lightning and fire. Evidence suggests that the project area was part of a frequent fire ecological system where surface fire burned across the entire landscape on a one to ten year interval. This would indicate that fire is a prominent disturbance agent and will have influence on this ecosystem in the future. The purpose of this report is to address how management of the area can change the degree of influence a fire disturbance could have on this ecosystem.

Of major importance within the project area is both Mexican spotted owl - *Strix occidentalis lucida* (MSO), and Northern goshawk - *Accipiter gentilis* (NGO). Mexican spotted owl habitat is specifically protected or managed around Protected Activity Centers (PACs) and has specified recovery and foraging areas. Northern goshawk habitat is specifically protected or managed around Post Fledgling Family Areas (PFAs), which include nest stands; and foraging habitat. The Larson project contains portions of five PACs within the project boundary and five more PACs along or within ½ mile of the project boundary.

Figure 1 - Larson stratified forested and non-forested land.

*Non-forested lands include meadows, wetlands, tanks, and gravel pits.

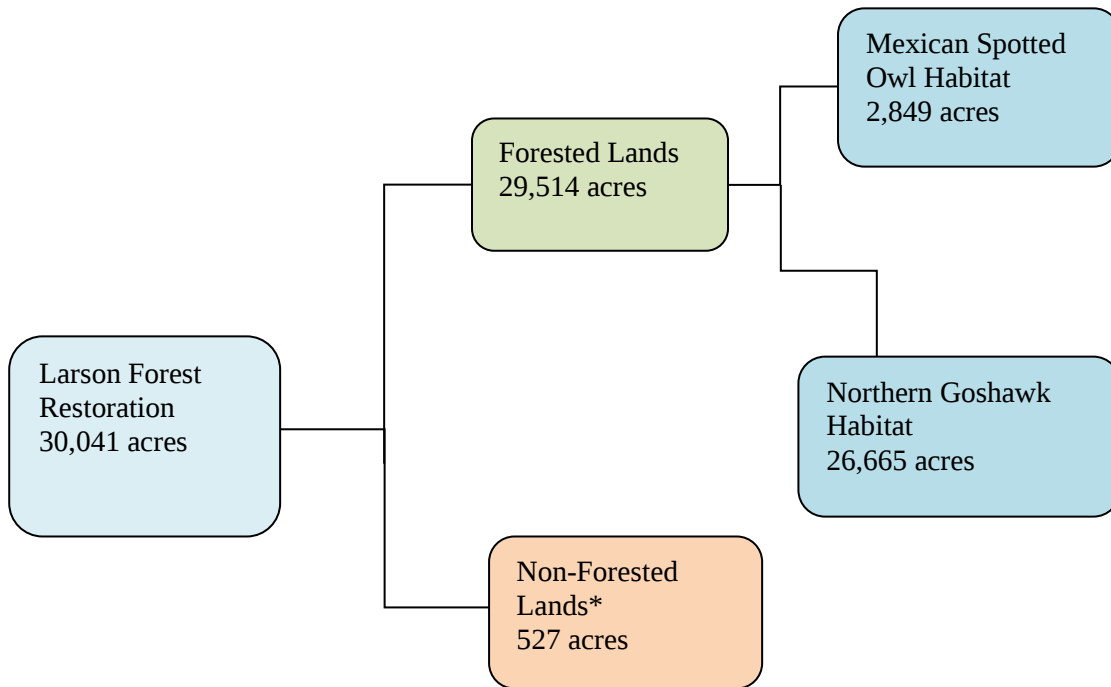


Table 1 - Mexican spotted owl (MSO) stratified habitat and acres in Larson.

Mexican Spotted Owl (MSO) Habitat	MSO Protected Habitat	Protected Activity Center (PAC) 1,630 acres	Mixed Conifer (acres) 640
			Pine-Oak (acres) 265
			Other (acres) 725
	MSO Recovery Habitat	Recovery Nest/roost 564 acres	Mixed Conifer (acres) 415
			Pine-oak (acres) 149
		Recovery Foraging 656 acres	Mixed Conifer (acres) 621
			Pine-oak (acres) 35

Table 2 - Northern goshawk (NGO) habitat stratification and acres in the Project Area

Northern Goshawk Habitat (acres) (Ponderosa pine forest)	Nest Habitat (acres)	
	216	
	Post Family Fledging Areas (PFA) Habitat (acres)	Uneven-aged (acres)
		416
	751	Even-aged (acres)
		335
26,793	Areas Outside of PFAs (acres) (Foraging)	Uneven-aged (acres)
		17,060
		Even-aged (acres)
	25,826	8,766

Desired Condition

Desired conditions are based on the Apache-Sitgreaves National Forest Land Management Plan (Forest Plan) (USDA, 1987) direction and management objectives. The project area is comprised of Management Area 1 (forested land – 29,521 acres) and Management Area 16 (520 acres – Chevelon Canyon).

Desired conditions include a healthy, vigorous, productive forest with a distribution of structural classes in the conifer forest cover type which result in a more sustainable and healthy forested landscape. Insect and disease risk would be lower than current conditions. Conifer forest would include a diversity of structures across the entire area. Aspen and oak regeneration would occur in patches across the landscape.

The desired condition for the Larson area includes a mosaic of different aged trees in groups and clumps across the landscape with interspaces containing grasses and forbs. Old growth would occur on about 20% of the area. Achieving a Fire Regime Condition Class (FRCC) 1 rating across the project area is a desired condition along with maintaining and improving current watershed conditions. FRCC 1 represents areas that have a high degree of consistency with reference conditions and the natural disturbance regime. These conditions present a low risk of losing key ecosystem components. This project was developed in response to the observed departure from historical reference conditions (Sensibaugh et al 2013).

Purpose and Need for Action

The Forest Service defines ecological restoration as the process of assisting the recovery of resilience and adaptive capacity of ecosystems that have been degraded, damaged, or destroyed. Restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to make terrestrial and aquatic ecosystems sustainable, resilient, and healthy under current and future conditions (USDA 2010).

The needs for the proposed action are derived from the difference between current conditions and desired conditions. Moving forest vegetation toward the historic range of variability and improving forest health is desirable because such conditions provide increased resiliency over the long term, with a lowered fire hazard, and enhanced wildlife habitat. Resiliency increases the ability of the ponderosa pine forest to survive natural disturbance such as drought, fire, insects, and disease. Watershed restoration actions would improve and/or maintain critical resource values such as water quality and quantity, wetland and riparian conditions, minimize sediment loss, and contribute to proper watershed functioning condition.

Specifically this project focuses on forest restoration which includes:

- **Vegetation** – Reduce tree densities in order to meet desired conditions that promote forest health, large tree growth, and increased herbaceous understory species and composition.
- **Wildlife** – Promote a forest structure that provides a diversity of higher density forests in groups with openness between these groups in northern goshawk habitat and Mexican spotted owl recovery (MSO) habitat.
- **Hazardous Fuels** – Reduce the risk of high-severity/high-intensity stand-replacing fires adjacent infrastructure, and threatened, endangered, and sensitive (TES) wildlife habitat.
- **Watershed Restoration** – To maintain and improve water quality and watershed function, while maintaining a transportation system that provides public transportation system that minimizes sediment delivery to streams.

There is a need to reduce wildfire hazard by reducing stand densities by; reducing canopy bulk density, increasing crown heights, and creating stand openness. There is a need to move a majority of the project area from a Fire Regime Condition Class (FRCC) 3 to a FRCC 1 by reducing stand density and reintroducing fire to the landscape.

To improve water quality and watershed conditions there is a need to address sources of sediment delivery and soil disturbance throughout the watershed. There is a need to:

- Obliterate and/or relocate existing system roads out of riparian areas to reduce the amount of sediment reaching streams.
- Reduce the amount of unauthorized roads and trails to reduce soil disturbance and improve water quality within the watershed.
- Improve degraded riparian conditions in stream channels, to increase channel stability, and promote stream resiliency to disturbance.

Proposed Action

Proposed treatment areas with the legal descriptions are shown in the Location section. Three alternatives are proposed for this project. Alternative 1 is the No Action Alternative where no actions would be proposed. Alternative 2, the proposed action is based on the Forest Service proposed action brought forward during the scoping process. Alternative 3 is based on input from members of the public on the desire to leave more trees greater than 16 inches diameter at breast height (dbh) by following a large tree retention strategy.

Apache-Sitgreaves Forest Plan Consistency

Management direction is found within the resource prescriptions of the Apache-Sitgreaves National Forest Land and Resource Management Plan (A-S LRMP), 1987. The Forest Plan's desired conditions and prescriptions for management of Management Area 1, Forested Land and Management Area 16, Chevelon Canyon. This analysis was developed in consideration of the best available science and is consistent with the National Forest Land and Resource Management Plan, as amended.

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and the other alternatives. The ASNFs Forest Supervisor is the Responsible Official for this proposal, which could include:

- Determine which forest restoration activities would be authorized.
- If the decision is to authorize forest restoration activities, design criteria and best management practices that would be implemented for this project.
- This decision would not include a special use permit nor modify an existing master special use permit.
- To not approve the proposal and require the effects of the proposed action be analyzed through an EIS.

Public Involvement

The proposal was listed in the National Forest Schedule of Proposed Actions (SOPA) since November 12, 2013. On November 7, 2013, for project scoping, a summary of the project proposal was mailed to 56 individuals and groups and 14 response letters were received within a 30-day period. Additionally a public meeting and field trip occurred on September 10, 2013. Availability of a Draft Environmental Assessment (DEA) was mailed to the same 56 individuals, groups and required government agencies for the official 30-day comment period for objection. A legal notice for this comment period was published in the White Mountain Independent on August 26, 2014. A total of 4 comment letters were received. Notice objection eligibility will be made to those who provided comment during the life of the project.

Response to Comments provided in the Draft EA and Objection of the First EA and Draft Decision Notice

Please see Appendix D for the content analysis completed on comments received on the Draft EA. Comments were both in support and opposition to part of the project and have been responded to in a modified proposed action.

Tribal Contact and Consultation

Letters describing the proposed action were provided to Native American Tribes on November 12, 2013. Comments received included the need to protect archaeological resources. Availability of this DEA was mailed to Tribal contacts for the official 30-day comment period for objection. Notice objection eligibility will be made to tribal contacts that provided comment during the life of the project.

Issues

An issue is a point of discussion, debate, or dispute about the environmental effects of the proposed activities. Issues are cause-effect relationships directly or indirectly caused by implementing the proposed action. Using comments provided from the public, other agencies, and industry representatives during scoping, issues were separated into key issues and issues eliminated from detailed study.

Significant Issues

There were no significant issues raised during the public involvement process.

Key Issues

Two key issues were used to focus the analysis:

1. Preservation of Large Trees

Specified commenters on this project during the scoping period noted that large post-settlement trees are those greater than 16-inch diameter at breast height (dbh) and should be retained.

Agency Response

Within both Alternatives 2 and 3, larger trees would be left, however more large trees would be left in Alternative 3. Alternative 3 was developed specifically to address the preservation of large trees by the use of a diameter cap of 16" dbh except for restoration of hardwood areas and meadows.

2. Landscape Openness

Many commenters during scoping were concerned that the proposed action may increase beyond allowable forest plan standards because natural openings would no longer be included within the VSS classification. They noted the proposed action could substantially increase the logging of

mature and old trees, and negatively affect wildlife, including goshawk and its prey species, and old growth needs.

Agency Response

A primary objective of the proposed action (Alternative 2) and Alternative 3 and modifications is the restoration of sustainable forest mosaic patterns with canopy gaps and forest openings totaling 10 to 20% in VSS 1 and 2 and grass-forb-shrub interspace of 10 to 20% within NGO habitat. Regeneration openings would range from 0.1 and 4 acres in size. Old growth characteristics would be maintained according to forest plan standards.

3. Treatments in MSO habitat

Specified commenters during scoping and during the comment period on the Draft EA were concerned that the proposed action included treatments within MSO protected and recovery habitat. They noted the proposed action could have adverse effects on MSO.

Agency Response

All MSO habitat (protected, recovery nest/roost, and recovery foraging) would be managed according to the Forest Plan (as amended) and MSO Recovery Plan guidelines. MSO recovery habitat would be managed for long term forest stand structure by implementing combinations of treatments to spatially distribute vegetation structural communities. Within the project area there are six PACs totaling 2,252 acres. Mechanical treatments would occur within 666 acres, or 30% of those acres with a group selection/intermediate thin prescription outside core areas. Mechanical treatments would also occur within 259 acres, or 12% of PAC acres in the project area. Total mechanical treatments would occur on 925 acres or 42% of the project area. Precommercial thinning would occur within 707 acres, or 31% of PAC acres within the project area. 620 acres or 20% of the project area are unfeasible or inoperable for mechanical or precommercial treatments. Broadcast burning would also occur within PAC areas. A total of 1,223 acres would be burned within PACS, this equates to 48% of the total PAC acres. All treatments were determined by the District to “may affect, not likely to adversely affect” the MSO and its critical habitat and affirmed by the US Fish and Wildlife Service through consultation (Letter of Concurrence, 9/17/2014).

Chapter 2 – Description of Alternatives

Alternatives Considered but not Analyzed in Detail

Federal agencies are required by the NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). In developing the proposed action the interdisciplinary team (IDT) considered a number of alternative ways to manage the project area. In addition, public comments received in response to the proposed action provided suggestions for alternate methods for achieving the purpose and need.

An alternative with no forest plan amendments

An alternative that did not require forest plan amendments was considered but dropped from detailed analysis since it would not meet the purpose and need to restore the landscape.

Due to the need to define and manage for interspace and in order to be consistent with the current MSO Recovery Plan, an alternative that did not include forest plan amendments was eliminated from detailed study. The ANSFs is currently in forest plan revision. Under the proposed forest plan, which is estimated for implementation by 2015, these amendments would not be needed. These proposed amendments are only needed under the 1987 ASNFs forest plan.

An alternative that does not use any maintenance level one roads

Maintenance level one roads (ML-1) are closed roads that are typically open for administrative purposes. An alternative to not open closed roads in the project area was considered but eliminated from detailed study since it would limit available treatment areas and not move the landscape towards desired conditions.

An alternative that only uses prescribed broadcast burning and no mechanical thinning

Due to dense stands an alternative only using prescribed broadcast burning would not be realistic or safe. Without reducing tree density, there is a strong likelihood that a prescribed broadcast burning would not be feasible.

Alternatives Considered in Detail

Alternative 1 – No Action

Under the No-Action Alternative, forest stands within the project area would not be treated. Fire hazard would continue to increase. Wildlife habitat improvements for northern goshawk and Mexican spotted owl would not occur. No road decommissioning or rehabilitation of unauthorized routes would occur, therefore water quality and watershed function would not improve. The project area would not move toward desired conditions, as outlined in the ASNFs Land and Resource Management Plan, as amended (1987).

Alternative 2

- Selectively cut trees and broadcast burn after treatment on approximately 25,701 acres
 - Treatments include:
 - group selection - 22,710 acres
 - intermediate thinning - 1,143 acres
 - pre-commercial thin 1,152 acres
 - shelterwood/seed cut with reserves¹ - 721 acres
 - This would be two mechanical entries, first the seed cut, then the shelterwood with reserves
- Broadcast burn without selectively cutting trees on approximately 4,906 acres.
- Allocate approximately 20% of acres for old growth characteristics.
- Mechanically treat up to 670 acres of trees within Mexican spotted owl (MSO) protected activity centers (PACs).
- Precommercial thinning on up to 700 acres in MSO PACs.
- Mechanically treat up to 26,916 acres in Northern Goshawk (NGO) foraging areas and post-fledgling family areas (PFAs).
- Rehabilitate up to 10 dispersed camping sites along Forest Service Road (FSR) 172.
- Repair two road water crossings along FSR 170B.
- Erect a 9.5 acre fence enclosure around the riparian area in Long Tom Canyon. Plant the enclosed area with native riparian species.
- Open approximately 156 miles of existing closed roads to be used for treatment activities. Close and rehabilitate roads when treatments are completed.
- Decommission approximately 7.5 miles of closed (maintenance level one) roads.
- Obliterate and rehabilitate approximately 45 miles of unauthorized routes in the project area.
- Amend the Apache-Sitgreaves forest plan to add clarifying language to: (1) describe desired conditions for the project area managed for northern goshawk; (2) express relative amounts of forest cover, as well as the distribution of that cover, including the interspaces between tree groups; (3) define the relationship between the interspaces and natural openings, such as meadows; (4) clarify that canopy closure is evaluated at the tree group scale within vegetation structural stages (VSS) 4, 5, and 6; and (5) align the forest plan with the 2012 Mexican Spotted Owl Recovery Plan from U.S. Fish and Wildlife Service.

¹ Reserve trees would be overstory trees uninfested with dwarf mistletoe.

Mechanical Treatments

For a complete description of the proposed treatments, please see Appendix B of the Vegetation Specialist Report. Methods include, but are not limited to: the use of chainsaws or feller-bunchers to cut trees and lop slash, skidders to move material to landings along forest service approved skid trails, and bulldozers to pile or rearrange slash for burning or erosion control. Other specialized equipment may be used to cut, chop, break, lop or treat the fuels to meet resource objectives. Landings created for treatments would range in size from ¼ to 1 acre with an average of one landing every 20 acres. Several products could result from treatments such as biomass, fuelwood, posts and poles, and sawtimber, which could be sold through personal use and commercial wood product contracts.

Within the treatments units identified for group selection, intermediate thin, and pre-commercial thinning, post-settlement ponderosa pines (in VSS class 5 or 6) may be removed. The creation of interspace and majority of timber harvest would be primarily focused in VSS 3 and 4.

Ponderosa pine in VSS class 5 or 6 may be mechanically removed if:

- According to the old tree implementation plan (Appendix D)
- The trees infected with mistletoe are in stands where the majority of the understory is free from mistletoe and,
- The infected trees have dwarf mistletoe rating (DMR) of 4 or more. *Mistletoes of North American Conifers*ⁱ (Geils 2002, pg. 69) provides instructions on rating dwarf mistletoe infections.

Where severe dwarf mistletoe infection centers are located the treatment would focus on removal of infected trees to establish new regeneration groups (VSS 1) or to favor existing uninfected regeneration. Where regeneration groups are not established, focus on reduction of severely infected trees within the leave tree group. In stands with overstory trees heavily infected with mistletoe (trees with a DMR rating of 4+), a shelterwood with reserves treatment would be used. The first entry of this treatment would be an even-aged treatment that involves leaving larger trees for regeneration and removing all trees in the understory that are infected with mistletoe. Once regeneration is established a second entry would be needed to remove the remaining infected overstory trees. This type of treatment is planned for approximately 700 acres on the Larson project area and would not adhere to the exemption categories presented in the LTRS.

Old and Large Tree Implementation

Appendix D of this EA describes the Old Tree Implementation Plan that would be utilized to determine instances where large or old trees (VSS 5 and 6) would be removed. Instances where these trees may be removed are described in detail in appendix D, but may include large/old trees located in the following areas:

- Seep and Spring Areas
- Riparian Areas
- Wet Meadows
- Encroached Grasslands
- Aspen and Forest Woodlands
- Ponderosa Pine/Gambel Oak Forests
- Within-stand Openings
- Heavily-Stocked Stands (with high basal area) Generated by a Preponderance of Large, Young Trees
- Areas with Dwarf Mistletoe

In Alternative 2, removal of large/old trees that meet the criteria set forth in the large/old tree implementation plan would be through mechanical treatments.

Meadow, Riparian, and Aspen Enhancement

All post settlement ponderosa pine would be cut where they have encroached into existing meadows and riparian areas. Riparian and meadow treatments would occur without the use of mechanized equipment. Trees that provide stream bank stability would be maintained regardless of size. Slash would be removed from the drainage and hand piled or lopped to the ground. Three existing and potential snags would be left around meadows for wildlife. Riparian planting would occur with native species within the stream channel (approximately 5 acres within the project area). Fences may be erected where stands of aspen are located to encourage aspen regeneration and to provide aspen protection from elk and deer browsing. All post-settlement conifers would be removed from areas previously fenced to exclude elk.

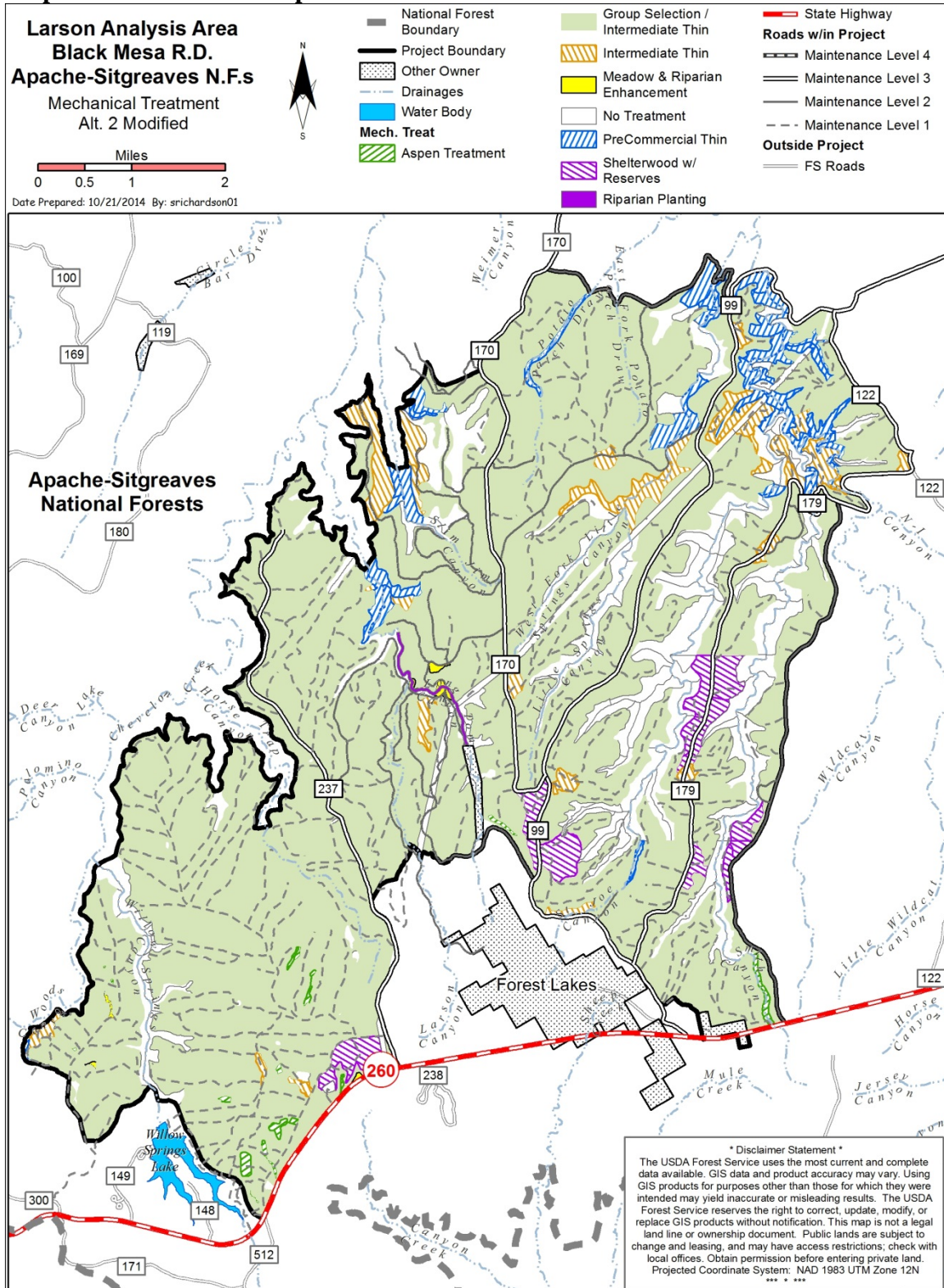
Treatments in Mexican Spotted Owl Protected Area Centers (PACs)

The Larson project contains portions of six PACs within the project boundary and five adjacent PACs along or within 0.5 mile of the project boundary. While most of the planned treatments would occur in ponderosa pine stands surrounding MSO PACs, some treatments are also proposed for areas within PACs, outside of the nest cores. The primary focus of the treatments is to reduce fire hazard to MSO protected habitat, while also enhancing nest/roost and foraging habitat. Prescribed broadcast burning would be used after mechanical treatments where necessary. In MSO nest/roost, recovery and foraging habitat key owl habitat elements would be retained and trees larger than 12 inches dbh would be favored, however, trees up to 16 inches dbh may be removed. The project would be consistent with the current MSO recovery plan (Forest Plan as amended 2012).

Treatments in NGO PFAs and foraging areas

Group selection would be used to regenerate ponderosa pine, white pine, and Douglas-fir in openings 0.1 to 4 acres in size within excess VSS classes and/or in areas heavily infected with dwarf mistletoe. Tree groups would be maintained by VSS class, generally in groups of 4 to 20 trees. Desirable dominant and co-dominant southwestern white pine and ponderosa pine would be left as single trees or groups throughout the area. When possible, regeneration openings would be created in areas with severe dwarf mistletoe infection.

Map 3 – Alternative 2 Proposed Mechanical Treatments



Prescribed burning

Prescribed burning refers to a controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions that allow the fire to be confined to a predetermined area, and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives. If prescribed burning is unable to occur due to environmental or personnel constraints, then additional mechanical entries would occur to meet fuels reduction objectives. Broadcast, maintenance, and pile burning are all types of prescribed broadcast burnings which are proposed for the Larson project.

Prescribed broadcast burning and maintenance burns

Prescribed broadcast burning is planned within a predetermined area (burn block) and with predetermined burning parameters (prescription) designed to meet the objectives stated in the proposed action. Prescribed broadcast burns would be located in areas where fuel loadings (dead fuels and/or live fuels) are unnaturally high due to exclusion of natural fire and/or an accumulation of activity slash from past treatments. In most cases, prescribed burning would occur following mechanical treatments.

Slash

Activity slash may be removed from the site to landings or be cut and scattered on the ground and may be treated later as part of a broadcast burn. A maintenance burn would follow the initial broadcast burn on a schedule of every 2 to 10 years. Maintenance burns would be located in areas where fuel loadings (dead fuels and live fuels) are close to their natural/historic state (generally less than 10 tons per acre). Burning activities would generally occur from October – December.

Larson Analysis Area
Black Mesa R.D.
Apache-Sitgreaves N.F.s
Prescribed Burning
Alt 2 & 3

Date Prepared: 8/19/2014 By: srichardson01

Legend:

- National Forest Boundary
- Project Boundary
- Other Owner
- Drainages
- Water Body
- Broadcast Burning
- State Highway
- Roads w/in Project
 - Maintenance Level 4
 - Maintenance Level 3
 - Maintenance Level 2
 - Maintenance Level 1
- Outside Project
 - FS Roads

The map shows the Larson Analysis Area within the Apache-Sitgreaves National Forest. The project boundary is outlined in black. Broadcast burning areas are shaded in light green. State Highways 99, 170, 179, 122, 100, 169, 119, 180, 237, 238, 300, 171, and 512 are shown. Other roads include 170, 179, 122, 237, 238, 300, 171, and 512. Drainages include Willow Springs Canyon, Little Spring Canyon, West Fork Little Spring Canyon, East Fork Little Spring Canyon, Sheep Creek, Mule Creek, Horse Creek, Jersey Canyon, Little Wildcat Canyon, Wildcat Canyon, St. Joe Canyon, Tomahawk Canyon, Deer Lake Canyon, Palomino Canyon, Chevelon Creek, and Willow Springs Canyon. Water bodies include Willow Springs Lake and Deer Lake. The town of Forest Lakes is located near the bottom center. A disclaimer statement is provided at the bottom right.

* Disclaimer Statement *

The USDA Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. Using GIS products for purposes other than those for which they were intended may yield inaccurate or misleading results. The USDA Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. This map is not a legal land line or ownership document. Public lands are subject to change and leasing, and may have access restrictions; check with local offices. Obtain permission before entering private land.
Projected Coordinate System: NAD 1983 UTM Zone 12N

Road Activities

No new permanent road construction is planned. The existing road system would be used and maintained with minor reconstruction and maintenance, commensurate with use. No temporary roads are planned. Maintenance level 1 roads currently closed to public use would be opened temporarily and closed after project activities are concluded. Closure methods include but are not limited to; physical barrier, gate, or regulated closure. Closed roads would be left in a stable hydrologic state and would be periodically maintained. During implementation, general road maintenance would be required prior to using existing system roads to access treatment units. These roads would be maintained as needed for the life of the project.

Road maintenance work includes but is not limited to: blading and shaping the roadbed, reshaping drain dips or grade sags, reshaping waterbars and cross ditches, spot rocking in the roadbed, brushing and removing danger trees, removing snow, minor realigning of road junctions, cleaning culverts, seeding, removing excess material from the roadbed, and placing fill material in ruts. Road reconstruction includes major improvements such as removing small trees and stumps, constructing new drainage dips, water bars, and outlet ditches.

Table 3. Existing System Roads w/ Proposed Changes

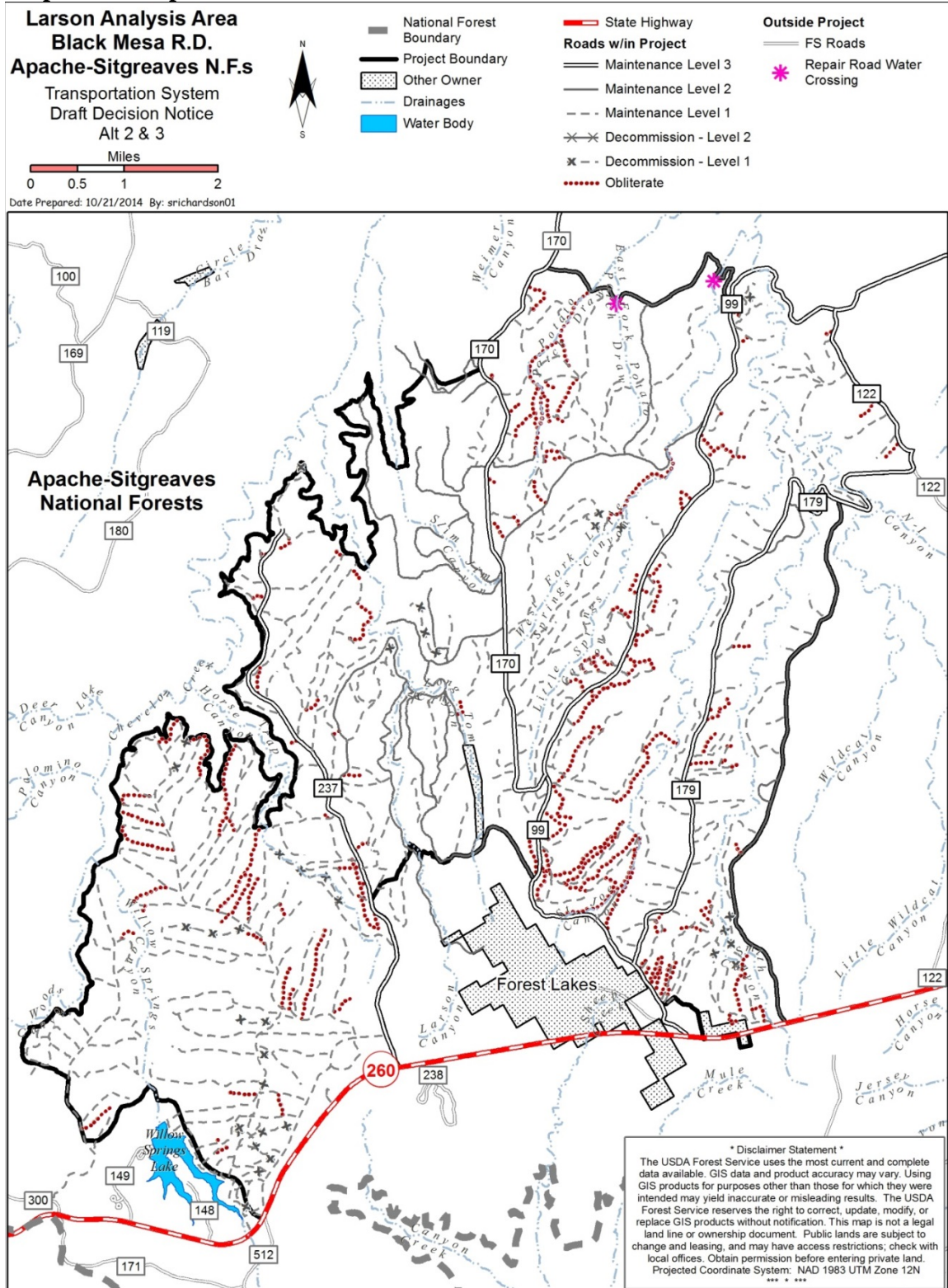
Road Number	Road Maintenance Level	GIS Miles
99I	DECOMMISSION - LEVEL 2	0.19
172G	DECOMMISSION - LEVEL 1	0.83
236E	DECOMMISSION - LEVEL 1	0.37
236G	DECOMMISSION - LEVEL 1	0.33
236H	DECOMMISSION - LEVEL 1	0.50
237	DECOMMISSION - LEVEL 1	0.14
9504I	DECOMMISSION - LEVEL 1	0.38
9504T	DECOMMISSION - LEVEL 1	0.10
9504Y	DECOMMISSION - LEVEL 1	0.92
9505A	DECOMMISSION - LEVEL 1	0.06
9505K	DECOMMISSION - LEVEL 1	0.11
9505M	DECOMMISSION - LEVEL 1	0.40
9505P	DECOMMISSION - LEVEL 1	0.32
9505R	DECOMMISSION - LEVEL 1	0.30
9505T	DECOMMISSION - LEVEL 1	0.49
9506I	DECOMMISSION - LEVEL 1	1.04
9507Y	DECOMMISSION - LEVEL 1	0.27
9525X	DECOMMISSION - LEVEL 1	0.18
9526M	DECOMMISSION - LEVEL 1	0.56
9527	DECOMMISSION - LEVEL 1	0.25
9527A	DECOMMISSION - LEVEL 1	0.06
9531A	DECOMMISSION - LEVEL 1	0.07
9532	DECOMMISSION - LEVEL 1	0.52
9532C	DECOMMISSION - LEVEL 1	0.76

* Total Miles of Level 2 Roads to be Decommissioned = 0.19 miles

* Total Miles of Level 2 Roads to be Decommissioned = 8.96 miles

* Total miles of User Created Roads to Obliterate = 44.9 miles

Map 5 – Transportation and Road Actions for Alternatives 2 and 3



Watershed Restoration Activities

Up to 7.5 miles of maintenance level 1 roads would be decommissioned and permanently removed from the Forest Service road system. Up to 45 miles of unauthorized motorized trails would be obliterated and returned to their natural state.

Along the FSR 170B two low-water stream crossings would be improved through hardening and bank stabilization. Along FSR 172 up to 10 dispersed camping sites may be rehabilitated. This includes ripping and seeding the ground in order to promote vegetation growth. The campsites would be temporarily closed. In the riparian area surrounding Long Tom Canyon, a 9.5 acre fenced enclosure would be erected in order to protect riparian tree and herbaceous species from elk and deer browsing. This area is already closed to cross country travel. Native willows and other riparian species would be planted within the enclosure. Streamside riparian plantings may occur to encourage vegetation growth on up to 5 acres within the project area.

Forest Plan Amendments

Two project specific, non-significant plan amendments. Amendments are non-significant amendments as they both result from the following changes that are not significant as listed in the Forest Service Manual for Land Management Planning 1926.51:

- 1) Actions that do not significantly alter multiple-use goals and objectives for land and resource management.
- 3) Minor changes in standards and guidelines
- 4) Opportunities for additional projects or activities that will contribute to the achievement of the management prescription.

These amendments are in adherence to 36 CFR 219.17(b)(2) under the 1982 Rule procedures and are subject to an objection process (36 CFR 219.52(a)).

These amendments would apply to the Larson Forest Restoration Project only. A site (project) specific plan amendment is a one-time variance in Forest Plan direction for the project; Forest plan direction reverts back to its original language/direction upon completion of the specified project. The language proposed does not apply to any other forest project. These amendments apply to alternative 2 and 3-modified of the Larson Forest Restoration Project. Specific language of the amendments can be found in Appendix A.

Amendment 1

The Apache-Sitgreaves National Forests Plan (hereafter referred as “Forest Plan”) directs projects to manage for uneven-aged stand conditions within northern goshawk habitat. Recent science has shown that historically more open spaces were present in the landscape and the importance of such open spaces (interspaces). Thus there is a need for a non-significant, project level Forest Plan amendment to include: the definition of **interspaces** within northern goshawk habitat (both within and outside of PFAs); how interspaces and openings relate to **vegetative structural stage** (VSS) and how canopy cover would be measured in landscapes within and outside of PFAs. Forested groups consist of interspersions of six vegetation structural stages (VSS 1 to VSS 6). For the purposes of this amendment, the following definitions apply:

- A **stand** is defined as a contiguous area of trees sufficiently uniform in forest type, composition, structure, and age class distribution, growing on a site of sufficiently uniform conditions to be a distinguishable unit. Four classification characteristics are generally used to distinguish forest stands: biophysical site (soils, aspect, elevation, plant community association, climate, etc.), species composition, structure (density and age (1-

- aged, 2-aged, uneven-aged)), and management emphasis (administrative requirements and local management emphasis that will shape structure over time).
- **Interspaces** are defined as the open space between tree groups (VSS 1-6) intended to be managed for grass–forb–shrub vegetation during the long term. Interspaces may include scattered single trees.

Amendment 1 description

In the “Vegetation Management - Landscapes Outside Goshawk Post-fledgling Family Areas” and “Vegetation Management -Within Post-fledgling Family Areas” section of the forest plan, a non-significant plan amendment would: (1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and define interspace, (2) add the interspace distance between tree groups and, (3) add language clarifying where canopy cover is and is not measured. The amendment would not impose requirements on the ASNF’s future management of goshawk habitat as the amendment is specific to this analysis. Because forest plan canopy cover requirements would be met in VSS 4 to 6 and movement towards balanced age classes would occur, the amendment is consistent with the management emphasis of achieving diverse and healthy stands. Appendix A contains the complete amendment along with a comparison of the language in the current forest plan.

Amendment 2

Amendment 2 is a non-significant, project level Forest Plan amendment for managing Mexican Spotted Owl (MSO) and MSO habitat in the Larson project area. For the purpose of this amendment, the following definitions apply:

- **Restricted areas/habitat** – Refers to areas that are not protected (such as PACs), but where specific guidelines for management activities are proposed. Restricted areas were part of the 1995 MSO Recovery Plan.
- **Recovery habitat** – Refers to areas outside of PACs managed as nest/roost, foraging dispersal, and wintering habitat. Recovery habitat includes pine-oak, mixed-conifer, and riparian forests as well as rocky canyons. Recovery habitat replaces restricted habitat in the 2012 MSO Recovery plan.

Amendment 2 Description

Amendment 2 would remove the treatment diameter limit of 9 inches diameter at breast height (dbh) in five MSO PACs and allow mechanical thinning within PACs and recovery habitat to reduce the risk of high-severity wildfire. It would also allow thinning and prescribed burning treatments within MSO nest cores. The amendment would remove language referencing monitoring (pre- and post-treatment, population, and habitat); replacement language would defer to a monitoring plan developed by the Forest Service, and U.S. Fish and Wildlife Service (FWS).

Alternative 3-Modified

Alternative 3, as brought forward in the Draft EA, was developed in response to public concerns on the retention of large trees and landscape openness. Alternative 3-Modified from first EA was brought forward to address these same issues and also specific concerns on the retention of large mistletoe infected trees. In Alternative 3-modified, within the treatments units, large, post-settlement ponderosa pines in VSS class 5 or 6 may be removed to meet restoration objectives according to criteria presented the Larson Old and Large Tree Implementation Plan (Appendix E). Alternative 3-Modified no longer considers criteria as listed in the 2011 Old Growth Protection and Large Tree Retention strategy as it did in the first EA, rather it incorporates an Old Tree Implementation Plan (Appendix 5), which meets the same objectives of retention of VSS class 5 and 6 trees, however it does not give authority to other entities to authorize tree removal or retention.

Differences between alternative 2 as brought forward in both the Draft EA and the first EA and this EA.

- The shelterwood/seedcut prescription would be with reserves in Alternative 2 in this EA.

Differences between the alternatives 2 and 3-Modified include:

- Areas proposed for Shelterwood/seedcut with reserves in Alternative 2 would be treated with group selection/intermediate thinning and large/old trees infested with dwarf mistletoe would be treated by means other than mechanically cutting which include but are not limited to mortality from prescribed burning, placement of insect attracting pheromones, and girdling.
- Dwarf Mistletoe infested ponderosa pine in areas outside of the 721 acres (proposed as shelterwood/seedcut in Alternative 2) would be treated by means other than mechanically cutting which include but are not limited to mortality from prescribed burning, placement of insect attracting pheromones, and girdling.
- Zero miles of temporary roads instead of up to two miles as brought forward in Alternatives 2 of the Draft EA

Differences between alternative 3-Modified from first EA and Alternative 3-Modified in this EA include:

- Areas proposed for Shelterwood/seed cut with reserves in first EA, are proposed as group selection/intermediate thinning.
- Throughout the treatments, dwarf mistletoe infested trees greater than 16" dbh were to be left in Alternative 3-Modified of the first EA. In this EA, dwarf mistletoe infested trees would be treated by means other than mechanically cutting which include but are not limited to mortality from prescribed burning, placement of insect attracting pheromones, and girdling.

Differences between alternatives 3 from the Draft EA and Alternative 3-Modified from first EA included:

- Shelterwood/seed cut with reserves proposed in areas not proposed for any treatment in Draft EA Alternative 3.
- Zero miles of temporary roads instead of up to two miles as brought forward in the Draft EA.
- Acreage differences in vegetation treatments and prescribed burning treatments due to changes to a MSO PAC boundary and incorporation of a new MSO PAC displayed in the acreage determinations in Alternative 3-Modified.

Old and Large Tree Implementation

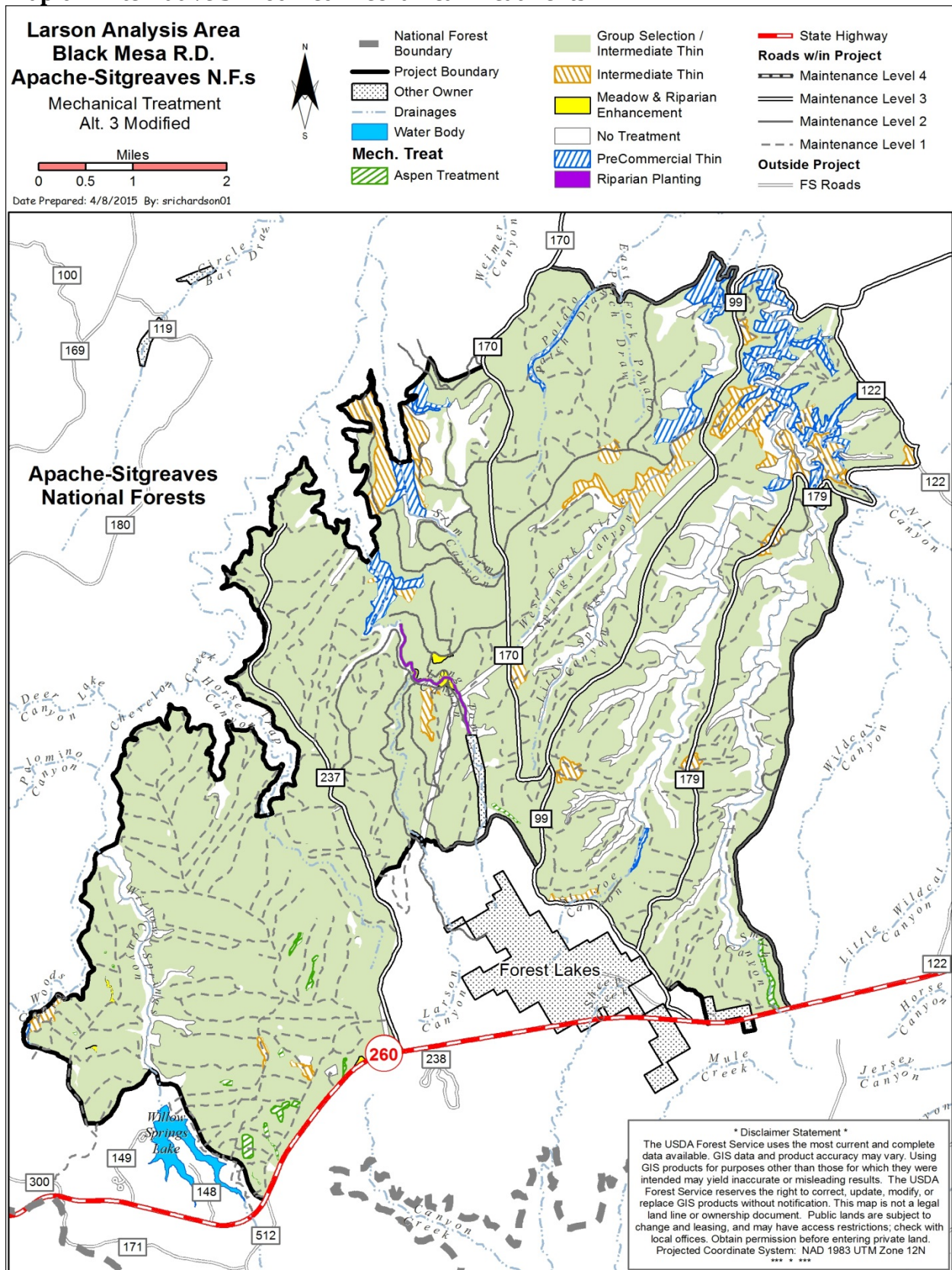
Appendix D of this EA describes the Old Tree Implementation Plan that would be utilized to determine instances where large or old trees (VSS 5 and 6) would be removed. Instances where these trees may be

removed are described in detail in appendix D, but may include large/old trees located in the following areas:

- Seep and Spring Areas
- Riparian Areas
- Wet Meadows
- Encroached Grasslands
- Aspen and Forest Woodlands
- Ponderosa Pine/Gambel Oak Forests
- Within-stand Openings
- Heavily-Stocked Stands (with high basal area) Generated by a Preponderance of Large, Young Trees
- Areas with Dwarf Mistletoe

In Alternative 3-modified, removal of large/old trees that meet the criteria set forth in the large/old tree implementation plan would be through mechanical treatments.

Map 6 – Alternative 3-Modified Mechanical Treatments



Comparison of Alternatives

Table 4 - Comparison of Alternative 2, Alt. 3 from Draft EA and Alt. 3-Modified from first EA, and Alternative 3-Modified

Treatment description	Alt – 2 Proposed action	Alt 3 from Draft EA	Alt 3-Modified from first EA	Alt 3-Modified
Mechanical Treatments	25,701 acres total	25,005 acres total	25,527 acres total	25,701 acres total
- Group selection/Intermediate thin - Intermediate Thin - Pre-commercial thin - Shelterwood/Seed Cut with reserves treatment - Treatment of Dwarf Mistletoe	22,710 1,143 1,152 696 25,701	22,710 1,143 1,152 0 0	22,710 1,061 1,019 721 0	23,431² 1,143 1,152 0 25,701³
Treatments in MSO PACs	Thin trees up to 16 inches outside of nest core areas.			
Interspace and VSS class – only applies to NGO habitat	Focus on creating interspace and regeneration openings in VSS class 3 and 4 (post-settlement tree groups less than 16 inches in size).			
Openings/Canopy cover – only applies to NGO habitat. No interspace proposed for MSO habitat.	10 – 20% in regeneration openings from 0.1 – 4 acres in size. 10 – 20% in interspaces (within stand openings) up to 0.5 acre where naturally occurring.			
Proposed Site Specific Forest Plan Amendments	Amendments #1 and #2 required			
Old growth forest allocation/management	<u>Project area allocation:</u> Mixed species = 20% Ponderosa pine = 20% Aspen = 20%			
Prescribed broadcast burning after mechanical treatments	25,701 acres	25,005 acres	25,701 Acres	25,701 acres
Prescribed broadcast burning with no mechanical treatments	4,180 acres	4,876 acres	4,906 acres	4,906 acres
Miles of maintenance level 1 roads opened	156 miles			
Miles of new road construction	Zero			
Miles of temporary Road Construction	Up to two miles	Up to two miles	Zero	Zero
Road decommissioning	7.5 miles			
Obliterate unauthorized routes ⁴	45 miles			
Improve stream crossings	2 sites along FSR 170B			
Fence exclosures for hardwoods	As needed to protect hardwoods			
Rehabilitate dispersed camp sites	As needed for watershed protection			
Planting riparian species (willows and cottonwoods) along stream banks	5 acres			
Aspen Enhancement	97 acres, and as needed within all treatment units			
Meadow Encroachment	13 acres			

² Areas proposed for Shelterwood/seedcut with reserves in Alt. 3-Modified from the 1st EA would be treated with group selection/intermediate thinning.

³ Large/old trees would be treated by means other than mechanically which include but are not limited to mortality from prescribed burning, placement of insect attracting pheromones, and girdling.

⁴ Routes are user created roads and trails that are not system roads.

Chapter 3 – Affected Environment and Environmental Consequences

Chapter 3 summarizes the physical, biological, social, and economic environments of the affected project area and the potential changes to these environments if the proposal was implemented. Chapter 3 presents the scientific and analytical basis for comparison of alternatives. Chapter 3 complies with implementing regulations (40 CFR 1500-1508) of NEPA for analytic and concise environmental documents (40 CFR 1502.2).

The effect, or impact, is defined as any change in the environment's existing condition produced by the proposal, either directly or indirectly. The project record contains copies of the effects analyses for the resources analyzed.

Cumulative Effects

A cumulative effect on the environment results from incremental effects of the proposed action, when added to effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with effects of other past, present, and reasonably foreseeable future actions, the effects may be significant (e.g., the ground disturbance from the alternatives added to ground disturbance from other activities in the same watershed would be cumulative).

Unregulated grazing greatly impacted grass/forb/shrub forest understories, in many cases so severely that naturally-occurring frequent fire activity was ceased (Sensibaugh et al. 2013). In some locations, no fire has occurred since the 1880s. This has resulted in high tree densities posing a high risk of uncharacteristically severe fire effects.

The first timber harvest entries in the area occurred in the 1940s. These actions focused on removal of large dying trees and high-grade lumber. From the 1950s-1970s, management focused on sanitation and salvage of diseased or damaged trees.

Starting around 1980 through the 1990s, management was focused on even-aged forest management such as the shelterwood silviculture system. Treatments were conducted on selected stands and large blocks of ten to one-thousand acres in size. Much of the treatments yielded pulpwood products and sawtimber.

Past and present activities

Table 5 – Past and Present Activities – All within the Black Mesa Ranger District

Past or present activity	Timeframe	Size	Location	Project Activities
Rodeo-Chediski Fire Salvage Project	2005	1,700 acres	Adjacent to Project Area	Salvage, Pile and Burning
Rim Top prescribed burn	2005	300 acres	Adjacent to Project Area	Prescribed burning
Forest Lakes WUI Treatment area	2005 – 2007	1700 acres	Adjacent to the Project Area. Adjacent to Forest Lakes Community.	Thinning, piling, and burning
High value ponderosa pine tree protection	2005 – 2008	700 acres	Adjacent to the project area. Within developed recreation sites.	Thinning, piling, burning, and application of pesticides to reduce bark beetle attacks.
Hidden Lake broadcast burn	2005 – 2009	900 acres	Within the Project area	Prescribed Burning
Jersey Horse Timber Sale	2005 – 2011	500 Acres	Adjacent to Project Area	Thinning, Piling, and Pile Burning
Little Springs Wildland Interface project	2006 – 2009	3,350 acres	Within and adjacent to the project area.	Thinning, Piling, and Burning
Nagel Forest Health Project	2006 – present	250 Acres	Away from the project area	Thinning piling, broadcast burning.
Hazard tree removal	2006 – 2012	300 acres	Within and adjacent to project area along AZ Highway 260.	Hazardous tree removal
Brookbank multi-product timber sale	2007 – 2010	60 acres	Adjacent to the project area	Thinning, Piling, and Yarding of fuels.
Bruno thinning and slash treatment	2010 – 2011	70 acres	Adjacent to project area	Piling and burning of slash
Rodeo-Chediski Prescribed Fire Project	2011	148,000 acres	Adjacent to the Project area, BMRD and Lakeside RD	Prescribed Broadcast Burning
Rim Lakes Forest Restoration	2013 – present	25,000 acres	Adjacent to project area	Thinning, Piling, and burning
SRP/APS power line mastication	On-going	Variable	Within and adjacent to project area on BMRD.	Removal and mastication of trees encroaching on the power line every five years.
Grazing	On-going	535,121 acres	Adjacent to and within the project area across the BMRD.	Livestock Grazing
Road maintenance	On-going	3,004 miles	Open roads across BMRD	Re-occurring road maintenance
Dispersed camping	On-going	District-wide	BMRD	Dispersed camping in popular locations.
Forest Lakes Brush Pit	On-going	2 acres	Forest Service property adjacent to Forest Lakes Community.	Brush disposal, burning, chipping
Forest Lakes Community Activities	On-going	1,246 acres	Private property – Forest Lakes Community	Thinning, Tree removal, road maintenance

Reasonably Foreseeable Activities

- Proposed Public Motorized Travel Management Plan – Currently, the ASNFs is in the process of analyzing changes to travel management in conformance with the Travel Management Rule (36 CFR 212, 251 (b), 261 (a)), including prohibiting motor vehicle use off the designated National Forest road system. A decision has not yet been made by the ASNFs, so it is too early to predict the changes that would occur from that decision.
- Heber Wild Horse Territory – The ASNFs in the process to create a wild horse territory management plan through analysis in an EIS. The wild horse territory is adjacent to the Larson project area. It is too early to predict the changes that would occur from that decision.
- Heber Allotment Analysis – The ASNFs is in the NEPA process to re-issue a term grazing permit for an allotment that is mostly adjacent to the Larson project area. A decision is expected in 2015.
- Rodeo Chediski Fire Restoration – This project would be analyzed in an EA and the proposal could include: additional prescribed burning, mechanical treatments, reforestation, wildlife habitat improvements, aquatic habitat improvements, system and user created road decommissioning, and watershed improvements. A decision is expected no sooner than 2017.
- Walnut Restoration – This project would be analyzed in an EA and the proposal could include: mechanical treatments, system and user created road decommissioning, watershed improvements, wildlife habitat improvements, aquatic habitat improvements, and prescribed burning. A decision is expected no sooner than 2017.

Affected Environment and Environmental Consequences

The analysis area for this Environmental Assessment is as shown on Map 2 (page 5). The project is comprised of approximately 30,041 acres in parts of two Arizona counties: Navajo and Coconino. Major features within the project area include Chevelon Canyon and various intermittent and ephemeral drainages. Elevations range from 6,500 to 7,821 feet. The only major highway, which is the southern boundary of the project area, is Arizona Highway 260.

The following section discloses a summary of the existing condition and environmental consequences of each alternative. More detailed information is available in specialist's reports for each resource area.

Soils and Water Resources

Existing Condition of Soil and Water Resources

Soils

Observations indicate satisfactory condition over most of the project area. Gully erosion and accelerated soil loss is occurring along a few open and closed roads where road drainage structures are not functioning or absent and are a source of sediment to streams, however, ground cover conditions are generally improving within these areas.

Water Resources

Table 6 - Fifth and Sixth Level HUC Watershed Acreage in the Larson FHP

Watershed (HUC 5) and Subwatershed (HUC 6)	Project Acres	HUC 5 Total Acres	% HUC 5th code	HUC 6 Total Acres	% UC 6th code
Upper Chevelon Canyon	29,052	173,690	16.73%		
Upper Wildcat Canyon	15,121			25,468	59.37%
Woods Canyon and Willow Springs Canyon	3,481			16,692	20.85%
Upper Chevelon Canyon-Chevelon Canyon Lake	1,690			17,069	9.90%
Long Tom Canyon-Chevelon Canyon	8,760			21,231	41.26%
Lower Chevelon Canyon*	3	146,787	0.002%		
Upper Potato Wash*	3			12,960	0.02%
Canyon Creek	986	203,233	0.48%		
Canyon Creek Headwaters	986			25,798	3.82%
Totals	30,041	523,710		129,572	

There are no impaired or non-attaining lakes and streams within the project area. Willow Springs Creek was found to exceed pH slightly in one sample where it flows into Willow Springs Lake, which does not exceed for those water quality parameters tested including pH. Willow Springs Creek then flows from this reservoir into Chevelon Creek, passing through a small portion of the Larson Forest Restoration Project. However, it is reasonable to assume that its water quality is the same as the source (Willow Springs Lake) during base flow conditions. Chevelon Creek is the most important water body downstream of the LARSON FOREST RESTORATION PROJECT and was found to exceed Arizona State water quality standards for biocriteria above Chevelon Lake and for dissolved oxygen below. Chevelon Creek is not considered to be impaired and the LARSON FOREST RESTORATION PROJECT will not alter these minor and likely naturally occurring exceedances.

Riparian/Stream Condition and Wetlands

The majority of streams are either intermittent or ephemeral within the project area. Upper Wildcat Canyon (67 miles), Long Tom Canyon-Chevelon Canyon (43 miles), Woods Canyon and Willow Springs Canyon (30 miles) have the most stream miles contained within the project area. These three watersheds therefore have the highest probability of management actions directly affecting stream channels. Four watersheds have no perennial streams within the project area. Both Canyon Creek Headwaters (3 miles) and Upper Chevelon Canyon – Chevelon Canyon Lake (7 miles) have less than 10% of their area within the project area and will not need further analysis but are described here in the affected environment sections for information purposes. There are only three acres of project in the Upper Potato Wash subwatershed and is not significant enough for further considerations.

Of the 88 miles of stream surveyed, 9 miles were rated as in Proper Functioning Condition, 64 miles were determined to be non-riparian, and the remaining 15 miles were rated as either Functional At Risk (12 miles) or Non-functional (3 miles). Overall, trends for Functional-At-Risk were interpreted as mostly improving.

There are a small number of wetlands within the project area as identified in the National Wetlands Inventory. These occur in the Woods Canyon / Willow Springs Canyon and Long Tom Canyon-Chevelon Canyon subwatersheds with a small pond found in the latter. All of the wetland features

occur in areas not proposed or suitable for mechanical treatments and are naturally buffered from timber activities (i.e., in meadows, gravel pits, steep slopes, or behind wildlife exclosures).

Roads

Roads are generally not more concentrated within the project area boundary than in the remainder of the watersheds. The project area has fewer roads because it contains proportionally more steep slopes, which restrict road construction. System roads are generally restricted to ridge tops. Open road densities are much lower than total road density in all watersheds within the project area. At least 0.7 miles of system roads show signs of active gully erosion and are in need of basic maintenance and repair. These include, but are not limited to FR9527 and sections of FR172.

Non-System roads (also referred to as “user created roads”) occur in locations where roads would not normally be placed such as perpendicular to steep slopes, over steep streambanks and along/in stream channels. Often these roads effectively “reopen” old logging roads that had been returned to a more natural state and were not adversely affecting hydrologic processes. Upper Wildcat Canyon and Long Tom Canyon-Chevelon Canyon Lake have most of the roads at 29 and 13.4 miles respectively. The other areas have very few miles due to their smaller project area and/or proximity to Forest Lakes Estates and the highway.

Table 7 - Non system Roads in Larson

Sixth Level HUC Watershed	User Created Roads in Project (Miles)	User Created Road Density (Proj. Mi/Mi ²)
Canyon Creek Headwaters	0.27	0.17
Long-Tom Canyon-Chevelon Canyon	13.41	0.98
Upper Chevelon Canyon-Chevelon Canyon Lake	0.00	0.00
Upper Wildcat Canyon	29.07	1.23
Woods Canyon and Willow Springs Canyon	1.97	0.36
Totals→	44.72	2.75

Figure 2 - Gully erosion along FR9527



Figure 3 - User created road along stream channel in Little Springs Canyon. The road crosses the channel numerous times before exiting the valley bottom via system roads 1.1 miles upstream.



Effects of Alternatives – Soil and Water Resources

Table 8 - Summary of Soil and Water Effect by Alternative

Feature	Alternative 1	Alternative 2	Alternative 3 – Original/Modified/Final
Upland Soils	No Change – soil condition satisfactory except in riparian areas.	Satisfactory Soil Condition maintained and may improve in riparian areas.	Satisfactory Soil Condition maintained and may improve in riparian areas.
		Some short term soil loss and soil compaction expected. Monitor SDC during treatment to ensure soil impacts stay within soil condition guidelines.	Similar soil disturbance as Alt 2.
	Coarse woody Debris meets soil quality guidelines.	Coarse woody debris meets soil quality guidelines.	Coarse woody debris meets soil quality guidelines.
Riparian Area & Stream Channel Condition	No riparian enhancement.	Reduces canopy in riparian areas to allow for improved vegetation condition.	Reduces canopy in riparian areas to allow for improved vegetation condition.
	Increased potential for uncharacteristic crown fire and accompanying increase in riparian & channel degradation.	Reduces potential for uncharacteristic crown fire and associated affects to riparian areas.	Reduces potential for uncharacteristic crown fire and associated affects riparian areas.
		Reduce risk of damaging stream flows caused by treatments. (CWE)	Reduced risk of damaging stream flows caused by treatments. (CWE)
Water Quality & Quantity	No change from current. Water quality and stream condition on slow upward trend from past activities (grazing, roads).	Creates a greater vegetative grass component than Alt 1 and Alt 3, thereby improving retention, storage, and filtering functions. SMZs and BMPs provide protection from sediment to riparian and stream channels.	Similar to Alt 2. However vegetative grass component transitions fewer acres and is shorter lived than 2.
		Opportunity to increase long term water yield.	Opportunity to increase short term water yield.

Cumulative Effects on Soils and Water Resources

Given the physical characteristics of subwatersheds in the project area, no long-term negative effects are expected and project activities will greatly improve subwatershed conditions in the long-term by reducing the risk of catastrophic wildfire.

Range Vegetation

Existing Condition

Table 9 – Allotment information within Larson Project Area

Allotment Name	Total Allotment Acres	Acres within Project Area	Percentage of Allotment within Project Area	Percentage of Project Area Containing Allotment
Long Tom	74,849	28,435	38%	96%
Heber	156,734	458	0.3%	1%
Wildcat	21,390	855	0.4%	3%

Environmental Effects

Alternative 1 - No action

With this alternative no treatments would occur. The area would continue to be overstocked with trees and the forest canopy/density would remain high. These stands would continue to get denser, which would further reduce forage production and species abundance. Areas of high forage production would remain high, in areas such as under the powerlines, with the regular thinning that occur.

Alternative 2 – Proposed Action

Alternative 2 would have the highest herbaceous understory response and the greatest understory plant diversity. Native grasses and forbs would improve in numbers and vigor with the reduced forest canopy in stands which fall below 35% Maximum SDI (see silviculture specialist report). Openings in the canopy would produce approximately 800 to 1000 lbs. /ac of forage on approximately 20-40% of the mechanically treated area. In the remaining 60-80% of the treated areas, forage may range from 200 to 400 lbs. per acre (Clary 1975). Production in the thinned forest areas would peak approximately 6 years after treatment (Clary 1975) but production in the forest gaps would be longer in duration and higher than Alternative 1 and 3, due to the larger number of openings and gaps in the canopy.

Alternative 3- Modified

Alternative 3-Modified would result in less understory plant diversity than alternative 2 but greater than Alternative 1, due to the limited creation of canopy gaps and forest openings. This alternative leaves more trees in the upper canopy, resulting in a slightly lower production of herbaceous understory than alternative 2. Openings in the canopy would produce approximately 800 to 1000 lbs. of forage on approximately 10% of the mechanical treated ground. In the remaining 90% of the treated area, forage may range from 200 to 400 lbs. per acres (Clary 1975). Production would peak

approximately 6 years after treatment (Clary 1975). Understory production would be of short duration as the canopy would close in within 10 to 15 years.

Cumulative Effects

The effects of this project on the pasture/unit rotations for each allotment would be minimal, as sheep (Long Tom Allotment) are herded and can avoid any treatment areas if necessary and the acreages are small on the other two Allotments (Heber and Wildcat). After the treatments have been completed, the cumulative effects from on-going grazing would be better livestock distribution patterns, by having more areas to graze.

Noxious Weeds

In the summer/fall of 2013 and the spring of 2014, noxious weed surveys were conducted within the Larson Project Area. Survey areas consisted of upland and riparian areas and also area along major roads within the project area. The results of the surveys found that there were no plants observed that are on either the Federal noxious weed list (2014) or the Arizona State Noxious Weed List (2014). There is also no records of past information of any listed weeds in the project area or relatively close. Since there are no known Federal or State listed noxious weeds located within or immediately adjacent to the project area, the risk rating is none for all alternatives.

Fire and Fuels

Existing Condition

Forests of central and northern Arizona have experienced major changes in ecological structure, composition and process because of relatively recent human activities such as cattle grazing, fire suppression, timber production and general human habitation in and near these forests (Covington and Moore 1994, Swetnam et al. 1999). One of the most apparent and critical changes in these forests is vulnerability of these ecosystems to uncharacteristic high severity fire. Such fires not only pose safety risks and valuable losses to human interests but also can drastically change and damage the ecological integrity of that system. Current structure and composition of the Larson ecosystem increases the likelihood of the area experiencing stand replacing crown fire. A crown fire would alter ecosystem function, destroy much of the existing wildlife habitat, create sediment problems to the watershed and decrease the desirability of the area for recreation. The Mogollon Rim has experienced many fires over the past several decades including several that burned with high severity and caused significant change and damage to the Rim ecosystem. Two notable examples are; the Dude fire of June 1990, which burned 24,000 acres west of the Larson area and the Rodeo-Chediski fire of 2002, which burned 460,000 acres to the east of the Larson project area. The fire history along, below and above the Mogollon Rim has created an island of forested vegetation that begins below the Mogollon Rim (south) and continues through and to the north of the Larson area. It is expected that the Larson area would burn with similar high severity as its surroundings have if no management occurs in the area.

Two factors that contribute to stand replacing crown fire are surface and canopy fuel distribution. Currently, the Larson area surface fuels especially in the form of logs are deficit and canopy fuels are overly abundant and continuous.

Desired conditions for surface and canopy fuels would allow for fire to function as a natural disturbance within the Larson ecosystem without causing loss of ecosystem function or to human

safety, lives and values. The desired forest conditions would provide for diversity within stands without sustaining crown fire.

Environmental Effects

Surface and Canopy Fuels

Table 10- Fire and Fuels Extension to the Forest Vegetation Simulator results by alternative post treatment.

FVS/FFE calculation results					
Forest Types	Criteria	Desired Conditions	Alt 1 - No Action	Alt 2 - Uneven	Alt 3- Mod and Final
Pine - Oak	Surface Fuel loading (tons per acre 3"-12"size class)	5 to 10	1-5	.01-.12	.01-.05
	Canopy Base Height (ft)	> 18	4	12	18
	Canopy Bulk Density (kg/m3)	< 0.05	0.06	.04	0.04
Ponderosa pine	Surface Fuel loading (tons per acre 3"-12"size class)	7 to 14	3.31-4.49	.05-.10	.05-.12
	Canopy Base Height (ft)	>18	10	18	27
	Canopy Bulk Density (kg/m3)	< 0.05	.07	.04	.04
Dry Mixed Conifer	Surface Fuel loading (tons per acre 3"-12"size class)	8 to 16	4-5.68	.02-.34	.02-.34
	Canopy Base Height (ft)	> 10	8	19	19
	Canopy Bulk Density (kg/m3)	< 0.08	.15	.06	.06

Fire Regime Condition Class (FRCC)

According to the Western United States Biophysical Settings Key (Comer et al. 2003) ponderosa pine and dry mixed conifer forests in the southwest have a dominant fire regime of I (frequent fire interval with low to mixed severity) and a mean fire interval of two to ten years in Ponderosa pine and five to 25 years in dry mixed conifer. Fires typically maintained open areas and replaced or opened up areas that exhibited a more closed canopy. With the absence of fire both the ponderosa pine and the mixed conifer stands have accumulated unnatural amounts of fuel primarily in the form of dense trees that would cause a fire to exhibit more extreme fire behavior. Both the ponderosa pine and the mixed conifer have missed multiple natural mean fire intervals. With the combination of missed burn intervals, the encroachment of mixed conifer, and the accumulation of old suppressed understory,

these areas are currently best represented as a FRCC 3. Under a no action alternative these areas would remain as a FRCC 3 over time and would be expected to burn with uncharacteristic fire severity.

Table 11 – Existing FRCCs

Habitat	Acres	No Action FRCC
Mexican Spotted Owl		
Protected Core	136	3
Protected Outside Core	1493	3
Recovery Foraging	656	3
Recovery Nest/Roost	564	3
Goshawk		
Nest	216	3
PFA	751	3
Foraging	25698	3

Table 12 – Post Treatment 2020 FRCC

Description	No Action FRCC	Alternative 2 FRCC	Alternative 3-Modified FRCC
Goshawk Foraging			
Aspen Treatment	3	1	1
Group Selection /intermediate Thin	3	1	1
Group Selection / Intermediate Thin - Old Growth <18"	3	2	2
Intermediate Thin	3	2	2
Burn Only	3	3	3
Precommercial Thin	3	3	3
Shelterwood/seed cut with reserves	3	2	2
Goshawk Nest			
Burn Only	3	3	3
Goshawk PFA			
Group Selection / Intermediate Thin	3	2	2
Precommercial Thin	3	3	3
Protected Core			
Burn Only	3	3	3
Protected Outside Core			
Intermediate Thin < 16"	3	3	3
Burn Only	3	3	2
Precommercial Thin	3	2	2
Recovery Foraging			
Group Selection /intermediate Thin	3	2	2
Burn Only	3	3	3
Precommercial Thin	3	2	2
Recovery Nest / Roost			
Group Selection /intermediate Thin	3	2	2
Burn Only	3	2	2

Table 12 - Post Treatment 2035 FRCC Following burn entries

Description	No Action FRCC	Alternative 2 FRCC	Alternative 3 Original/ modified/ final FRCC
Goshawk Foraging			
Aspen Treatment	3	1	1
Group Selection /intermediate Thin	3	2	2
Group Selection / Intermediate Thin - Old Growth <18"	3	2	2
Intermediate Thin	3	2	2
Burn Only	3	3	3
Precommercial Thin	3	2	1
Shelterwood/seed cut with reserves	3	1	2
Goshawk Nest			
Burn Only	3	3	3
Goshawk PFA			
Group Selection / Intermediate Thin	3	2	2
Precommercial Thin	3	3	3
Protected Core			
Burn Only	3	3	3
Protected Outside Core			
Intermediate Thin < 16"	3	3	3
Burn Only	3	2	2
Precommercial Thin	3	2	2
Recovery Foraging			
Group Selection /Intermediate Thin	3	2	2
Burn Only	3	3	3
Precommercial Thin	3	2	2
Recovery Nest / Roost			
Group Selection /intermediate Thin	3	1	1
Burn Only	3	2	2

Cumulative Effects

Vegetation treatments along, above and below the Mogollon Rim have contributed to the current and will contribute to shape the future vegetation conditions for the area. Over the past 25 years management surrounding the Larson area has included prescribed burning, pile burning, mechanical thinning and various harvests as well as grazing and wildlife focused projects. Within the Apache Sitgreaves National Forest boundary three projects are adjacent or in close proximity to the Larson project area. The Nagel Forest Health Project area (north of Larson), the Little Springs, and Rim Lakes project areas are located adjacent to the Larson area. All three of these areas are being treated for wildland urban interface protection from wildfire. Furthermore, private land owners have made efforts and will foreseeably continue to make efforts in the area to treat for fuels reduction and restoration. To the south and southwest of Larson the Tonto National Forest is implementing the Chamberlain and Christopher Hunter projects. These include mechanical thinning followed by prescribed burning in phases over the next several years below the Mogollon Rim. The combined effect of these ongoing projects and many foreseeable projects along, above and below the Mogollon

Rim for restoration and fuel reduction provide for a mosaic of stand conditions, allowing for wildlife habitat and vegetative diversity. This same mosaic would allow for a diversity of fire effects thereby increasing opportunities for the maintenance of desired forest structure and function using wildfire and prescribed fire in the long term future. Both action alternatives proposed in the Larson area would continue to create a mosaic of fuel along the Mogollon Rim. Alternative A would continue to maintain the Larson area with high potential for severe fire effects across the landscape.

Forest Vegetation

Existing Condition of Vegetation

Table 13 - Forested and Non-forested acres based on stratification.

Stratum	Cover Type Acres
Forested	
Ponderosa pine	27,754
Mixed Conifer	1,676
Aspen	63
Total Forested	29,493
Non-Forested	
Private Land	120
Grassland	419
Gravel Pit	9
Total Non-Forested	548
Total Project Acres	30,041

Non-Forest Vegetative Cover Type

Dry meadows and grasslands are present in the analysis area. The powerlines are maintained on a 5 year basis as grassland, and therefore were classified as grassland rather than forested because they are excluded from goshawk management. Two gravel pits fall within the area with ponderosa pines encroaching into them.

Forest Health

For the purposes of this analysis, forest health is defined by the vigor and condition of the forest stands, and the presence of insects and disease that affect the sustainability of the forest. A working definition of a healthy forest is a forest where:

- 1) Stand densities are at levels that facilitate overall forest development, tree vigor, and resilience to characteristic disturbances, and;
- 2) Native insect and disease activity is within the historic range of variability, and non-native insects/diseases are absent or incidental and;
- 3) Forest structure represents all age classes necessary for a sustainable balance of regeneration, growth, mortality and decomposition, and;
- 4) Overall these conditions are resilient to natural biotic and abiotic disturbances (e.g., insects, diseases, fire, and wind).

Stand Density

Stand density is the dominant factor affecting the health and vigor of the forest (SAF 2005). Based upon established forest density/vigor relationships, density-related mortality begins to occur once the forest reaches 45-50% of maximum stand density, and mortality is likely at density levels of 60%+ of maximum stand density.

The Larson project area is beginning to see declining tree growth and minimal forage production because the majority of stands in the Larson project area have maximum stand densities over 45%. Severe competition for light, water, and nutrients is occurring as seen in Figure 4. Larger trees are dying from individual bark beetle attacks and understory competition. The majority of stands have not had any thinning occur in the 5 inch to 12 inch size classes leaving them extremely dense with interlocking canopies. Goshawk foraging habitat represents 87% of the forested project area and of these acres approximately 70% is in zones 3 and 4 maximum stand density.

Figure 4 - High stand density within the project area (Sensibaugh et al. 2013).



Figure 5 - Low to Moderate Stand Density (Uneven-aged Management Strategy) representing the historic condition (Sensibaugh et al 2013).



Insects and Diseases

The last insect and disease aerial surveys on the Apache-Sitgreaves National Forests (USDA 2008a) conducted in the late summer show a continuation of bark beetle-related mortality in the mixed conifer. Bark beetle activity in Douglas-fir (Douglas-fir beetle) and white fir (fir engraver beetle) has been increasing over the past few years the Black Mesa Ranger District, especially in the canyons (Fairweather 2008).

Past seasons of drought and overly dense forests are the primary triggers of the epidemic that recently occurred in the Southwest (USDA 2008a). An outbreak of bark beetles, starting in 2002 to 2003, resulted in widespread mortality across Arizona, including mortality within the project. The outbreak was primarily the result of several native bark beetle species responding to the weakened condition of moisture-stressed, over-crowded forests. Trees in stress-prone stands were most affected (Fairweather 2008). A decrease in affected acres began to occur in 2007 (USDA 2008a). Bark beetle activity in ponderosa pine currently appears to be at endemic levels.

Bark beetle hazard is high over the analysis area. In general, ponderosa pine stands that have an average diameter greater than 12 inches are hazard-rated based upon stand BA: BA greater than 120 ft²/acre are considered at high hazard to bark beetle attack; BA of 80 – 120 ft²/acre are considered moderate hazard; and BA less than 80 ft²/acre are considered low hazard (McMillin 2004).

Dwarf mistletoe infection in ponderosa pine and Douglas-fir is common throughout the area. Dwarf mistletoes continue to have a major impact on growth and mortality of conifers in the Southwest (USDA 2008a). Approximately 87% of the acres with current stand exam within the project area have some level of infection. Southwestern dwarf mistletoe was observed in ponderosa pine and Douglas-fir dwarf mistletoe in the Douglas-fir.

Table 14 - Acreage percentages of existing and desired stand level dwarf mistletoe infection by severity class within the Larson project area (Hawksworth and Weins 1996).

Infection Severity Class	Uninfected	Light	Medium	Heavy	Severe	Acres
	0	.1-.25	.26-0.9	1.0-1.9	2.0+	
Percent Infection	0	1-20%		20-50%	50%	
Existing Condition	1,612	3,379	4,137	3,088	248	12,463
% of Infected Acres	12.9%	27.1%	33.2%	24.8%	2.0%	

White pine blister rust (an exotic disease) has recently been detected in eastern Arizona on both the Apache-Sitgreaves National Forests (NF) and the Fort Apache Indian Reservation. The effect of this disease is well-known throughout the U.S., and on the Lincoln National Forest NF in New Mexico. White pine blister rust poses a threat to southwestern white pine, causing severe mortality throughout its range. Some genetic resistance to this disease has been identified on selected individual white pines on the Lincoln NF. For this reason, it is critical that the full genetic diversity of southwestern white pine be maintained throughout its range. Healthy white pines would be retained, favored and regenerated wherever possible.

Other Effects to Forest Health

Browsing of hardwood and conifer regeneration by livestock and game ungulates is heavy throughout the area. The only tree species unaffected by browsing is southwestern white pine (Fairweather 2008). In many locations, aspen clones are not successfully regenerating due to browsing damage resulting from cattle, elk, deer, and other ungulate animal species.

Forest Structure

Mexican Spotted Owl Habitat

Structural habitat required for MSO recovery nest/roost habitat is below the required minimums. Stands from the MSO recovery habitat were evaluated individually and averaged prior to selection of MSO nest/roost habitat. Details for each of the stands can be found in the Silviculturist Report.

Table 15 - Existing condition for MSO recovery foraging habitat.

Forest Type	Acres	% of BA in 12-18 inch dbh trees	% of BA in >18 inch dbh trees	Minimum BA sq ft	Minimum density of trees > 18 inches
Mixed Conifer	1,057	22%	29%	162	15
Pine oak	184	28%	14%	146	7

Goshawk Forest Habitat

Three scales were used to examine existing VSS distribution and densities in goshawk forest habitats, as directed by the forest plan: stand (fine-scale), compartment (mid-scale), project (landscape). Details for these three levels can be found in the Wildlife Specialist Report. Stand-level characteristics are most relevant to analysis of management treatments, so the stand level analysis was used throughout this report to represent existing condition and for simulation modeling of alternatives. The acreages for the stands were combined below for the Larson area.

Table 16 - Goshawk Foraging stands in 2015 by VSS/ percent area.

Vegetative Structure Stage (VSS)	Tree Diameter	Existing % of Area	Forest Plan Desired % Distribution *
– Grass/Forb/Shrubs	0.0 – 0.9”	0	10
2 – Seedling/Sapling	1.0 – 4.9”	3	10
3 – Young Forest	5.0 – 12”	57	20
4 – Mid-age Forest	12.0 – 17.9”	26	20
5 – Mature Forest	18.0 – 23.9”	12	20
6 – Old Forest	24”+	2	20

* The forest plan standards and guidelines do not describe desired even-aged stand conditions for goshawk foraging area habitat. It is desired to convert all foraging area even-aged stands to the desired uneven-aged structural conditions.

Table 17 - Goshawk PFA in 2015 by VSS/ percent area.

Vegetative Structure Stage (VSS)	Tree Diameter	Existing % of Area	Forest Plan Desired % Distribution
1 – Grass/Forb/Shrubs	0.0 – 0.9”	0	10
2 – Seedling/Sapling	1.0 – 4.9”	17	10
3 – Young Forest	5.0 – 12”	67	20
4 – Mid-age Forest	12.0 – 17.9”	0	20
5 – Mature Forest	18.0 – 23.9”	17	20
6 – Old Forest	24”+	0	20

* The forest plan desired conditions applies to goshawk foraging and PFA habitat only.

Existing condition for goshawk nest stands average 175 square feet of basal area ranging from 111 to 230 square feet of basal area. Approximately 57% of the area is in VSS 3 and 26% is in VSS 4.

The existing even-aged stands are not desired for goshawk forest habitat except as nesting stands. The existing uneven-aged forest structure does not comprise a balance of VSS classes, and habitat components, such as canopy gaps (VSS 1 and 2). Interspaces between groups of trees consisting of mixtures of grasses, forbs, and shrubs are lacking or limited in most stands. VSS 3 and 4 are over-represented, and VSS 1, 2, 5 and 6 are deficit relative to a balanced age/structure uneven-aged condition within the foraging areas. Goshawk PFAs have an excess of VSS 3 and lacking the larger tree component.

Overall, uneven-aged stand conditions currently represent 66% of all goshawk habitat in the project, with the remainder being even-aged. Of the even-aged stands, 25% is mid-aged to mature (VSS 4+), and 75% is immature (VSS 1-3).

Since group VSS is determined by the predominant density within the group, this table does not clearly show that there are many smaller trees, 1 to 5 inches in diameter, that are being overtopped by larger trees. These smaller trees are often not free to develop due to the high density of larger trees in the VSS 3 and 4 classes. Similarly, many of the larger trees greater than 18 inches dbh are competing with the densely stocked mid-aged trees for water and nutrients. This decreases the vigor and longevity of these large trees.

Old Growth

Old growth is analyzed at three scales: stand, project level, and district. In this case, the Larson area is considered the project level. Old growth standards seek to allocate no less than 20% of each forested ecosystem management area and allocations would consist of landscape percentages meeting old growth conditions and not specific areas (USDA 1987, as amended 2009).

The forest plan defines old growth as a condition of the forest having structural attributes based on the number of large trees per acre, basal area, canopy cover percent, dead standing trees, and down logs. The three groups identified for developing old growth in the project are interior ponderosa pine, aspen, and the mixed species group consisting of Douglas-fir, white fir, and southwestern white pine.

Approximately 4,561 acres, 15% of the forested project area, have been identified and allocated through previous analyses to be managed towards old growth criteria. Stands identified as MSO protected habitat, MSO recovery nest/roost habitat, and NOGO nest stands were allocated for old growth development across the district. Areas currently allocated do not necessarily meet old growth standards in the forest plan but are managed to move towards those conditions to meet old growth structural attributes over time.

Cumulative Effects on Old Growth

The cumulative effects boundary for old growth was analyzed at the Black Mesa Ranger District. Actions occurring in the past, present, and reasonably foreseeable time (see table 5) have and would contribute to the old growth across the Black Mesa Ranger District. Table 18 below displays old growth allocation as it would occur both in the Larson Project area and within the cumulative effects boundary of the Black Mesa Ranger District.

Table 18 - Acres and percent of area allocated for developing old growth within the Larson project and the Black Mesa Ranger District.

Old Growth Forest Cover Type	Larson Total Acres	Larson Current Old Growth Allocated Acres	Larson Current Percent Allocated	Black Mesa District Acres	Current District Old Growth Allocated Acres*	Black Mesa District Percent Allocated
Aspen	63	0	0%	296	61	21%
Mixed Species	1,676	782	46.7%	18,302	9,131	50%
Ponderosa Pine	27,755	3,779	13.6%	295,848	51,270	17%
Unknown				74,326	2,802	4%

Effects of Alternatives on Vegetation Resource

Effects common to all alternatives

Alternatives 2 and 3 do not include any activities directed toward changing vegetation types. All treatments proposed would not change the vegetative cover types. Road obliteration proposed under alternatives 2 and 3 would provide a seed bed allowing for regeneration and restoration of the road beds. Road improvements proposed would have no effect to the vegetation or change in forest structure.

Stands that would be left untreated in all alternatives would continue to become denser and decrease in vigor and health over time. Grass/forb/shrub presence would decrease, and growth would continue to decline. No canopy gaps would be created for seedling regeneration, or to restore forest interspace. Growth of trees would be slower than the treated stands.

Alternative 1 – No Action

No vegetation management activities are proposed under alternative 1. No opportunities for timber or other biomass products produced, and no costs would be incurred for thinning or burning treatments.

Direct and Indirect Effects

Stand Density

Stand densities would not be reduced. Assuming no disturbance such as fire or insect outbreaks, over the next 20 years, growth modeling simulation shows that stand densities would increase to levels ranging from an average of 45-71% of maximum stand density in 2035. These density levels are at the threshold or well within maximum stand density-related mortality.

Insects and Disease

Bark beetle hazard would increase as stands become denser. Alternative 1 has the highest bark beetle hazard and would result in higher probable tree mortality than alternatives 2 and 3.

Dwarf mistletoe in ponderosa pine and Douglas-fir would continue to intensify within the areas of current infections, and the size of the current infection centers would slowly spread over time. Dwarf mistletoe would continue to impact regeneration, reduce cone production, reduce dbh and height, and reduce survival of sapling-sized trees. Over two to four decades this would severely limit sustainability of uneven-aged stands where current infection levels exceed 25% of host trees (40% of the analysis area). Trees with severe dwarf mistletoe infection levels exhibit low vigor overall, and these trees are more susceptible to bark beetle and density-induced mortality. Resistance to bark beetle mortality would continue to decline due to increased density and rise of mistletoe infection.

Forest Structure

Under alternative 1, no conifer regeneration treatments would occur. Even-aged stands would remain even-aged in structure, and no new age classes would be created and/or managed. Uneven-aged stand structures would not be maintained over time, due to lack of regeneration of new age classes. Restoration of sustainable forest mosaic patterns with canopy gaps and forest openings would not occur, and canopy continuity would remain high throughout the project area. Mixed conifer forest stands would continue to be dominated by shade tolerant species, or would continue to convert to dominance of these species over time. No forest habitat or allocated old growth stands would be

treated to improve health and vigor of the stand, or to manage forest structure towards desired conditions. Natural meadows and openings would not be maintained. Quaking aspen and Gambel oak patches would not be released or favored to develop. Opportunities to favor and regenerate Southwestern white pine would not occur under this alternative.

Forest Structure - Mexican Spotted Owl Stands

This alternative more closely meets the desired condition for density in the recovery nest/roost habitat than alternatives 2 and 3 as no broadcast burning or thinning would occur. Stands continue to get denser with a gradual increase in BA. Basal area percentages themselves do not change and are the same as alternative 2 and 3.

Forest Structure - Goshawk stands

Approximately 84% of the foraging area would be dominated by VSS 3 and 4 with little change overtime. The PFA stands would lose the large tree classes as VSS 2, 3, and 4 become the dominant groups due to mortality in the large trees and the large number of trees in the smaller age classes across the landscape. This alternative moves away from the desired condition and becomes more even-aged overtime.

Old Growth

This alternative would not meet the forest plan percentages for allocated old growth within the project area as no additional stands would be allocated for old growth management. Stands identified under past timber sale decisions would continue to be managed as allocated old growth, and tree size development would be limited by existing high stand density. Stands would not receive thinning or burning to reduce the fire hazard or improve health and individual tree growth. Stand density would continue to increase reducing the growth and health of the larger trees. Stands with potential to develop towards quality old growth characteristics may or may not achieve these objectives without receiving restorative management treatments.

Alternative 2 - Proposed Action

Alternative 2 proposes to conduct commercial and non-commercial thinning using mechanical equipment. This alternative proposes management of forest density and structure by implementation of uneven-aged selection cutting in all stands managed for northern goshawk PFA and FA forest habitat, and all stands managed for MSO recovery foraging habitat. Meadow enhancement is proposed for small meadows and wetlands within the project area. MSO protected habitat stands would be thinned from below 16 inches dbh. Shelterwood with reserves would be used to reduce dwarf mistletoe on 721 acres resulting in two mechanical entries. MSO recovery nest/roost habitat would be thinned from below to meet the desired condition for forest plan density criteria. Prescribed fire would be used to reduce natural and treatment fuels in both thinned and un-thinned areas. Opportunities for timber or other biomass products would be produced, and costs would be incurred for thinning and burning treatments under alternative 2. See the silvicultural prescription details in appendix B of the Silviculture Report.

Direct and Indirect Effects of Alternative 2

Alternative 2 moves the treated areas towards healthier forest conditions by managing for uneven aged conditions, restoring vigorous growth conditions and reducing losses due to tree mortality, high-severity wildfire, and insects and diseases.

Stand Density

Alternative 2 would be the most effective alternative for increasing forest health and vigor, thereby improving forest resiliency and sustainability to stresses such as insects, disease, and climatic

variability. Based upon all forest stands (treated and untreated), 90% of northern goshawk habitat forest types (by area) and 100% of MSO recovery habitat foraging habitat (by area) would be projected to meet desired maximum density conditions post-treatment. Old growth stands that retain all trees 18 inches dbh and greater are still in zone 3 and considered high density.

In MSO protected habitat outside core forest areas (where thinning is restricted to cutting trees up to a maximum 16 inches dbh), a reduction of excess density in understory trees would occur, but overall forest canopy cover and continuity would remain unchanged. Effects on forest health and vigor would be minimal as a result of these treatments, but minor improvements in the ability to implement and control prescribed fire treatments would be realized.

Insects and Disease

Of the three alternatives, this alternative would be the most effective treatment for reducing bark beetle hazard as the majority of the area moves towards uneven-aged conditions. Decreasing stand densities would release dominant and co-dominant trees allowing them to become more vigorous, more resistant to insect and diseases (McMillin 2004), and grow at a faster rate into larger tree size classes. After treatment, it is projected that approximately 70% of the analysis area would be in the low hazard category. On 16% of the analysis area, beetle hazard would remain high due to stands which would not receive treatments that reduce forest canopy density (no treatment, broadcast burning only treatment, or limited treatment –MSO protected and recovery habitats, steep slopes). The remaining 14% is reduced to moderate with a short term effect.

This alternative would provide the most opportunities to manage dwarf mistletoe severity, incidence, and distribution; in order to move towards desired endemic forest disease levels within the project area. Treatments would alternately focus on removal of infected trees in locations where new regeneration groups (VSS 1) would be established or favored, and where canopy gaps would be developed or restored. Elsewhere within the stands, treatment would focus on reduction of the percentage of severely infected trees. Severe dwarf mistletoe infection centers are typically circular in shape, but seldom exceed 4 acres in size. Adherence to the 200 feet opening width limitation (forest plan guidelines) would in some instances limit the ability to create replacement regeneration openings sufficient to manage dwarf mistletoe towards desired conditions.

Forest Structure

Existing even-aged stands would be managed to develop a new age class, and would become two-aged stands within one decade after treatment. Existing uneven-aged stand structures would be maintained as uneven-aged stands, and would be managed over time to develop a balance of age classes in a mosaic of tightly-interspersed structural groups. Restoration of sustainable forest mosaic patterns would occur, and the resulting forest canopy would be discontinuous and clumped throughout much of the area, based upon desired conditions.

Forest Structure – Mexican Spotted Owl

In MSO protected habitat forest areas, where thinning is restricted to cutting trees up to a maximum 16 inches dbh, a reduction of excess density in understory trees would occur, but overall forest canopy cover and continuity would remain unchanged. Effects on forest health and vigor would be minimal as a result of these treatments, but minor improvements in the ability to implement and control prescribed fire treatments would be realized due to the reduction of ladder fuels.

In the recovery nest/roost habitat, broadcast burning appears to have dropped the minimum BA for the one stand that is being thinned. Stand prescriptions however would be written to meet the minimum BA requirement of 120 BA for mixed conifer. Basal area percentages themselves do not change and are the same as alternative 1 and 3. Alternative 2 is the same as alternative 3.

Forest Structure - Goshawk

Stands would be evaluated to determine excess or deficit vegetation structural stages (VSS $\approx$ age classes) and groups/individual trees would be removed or favored to move towards the desired balance. Alternative 2 moves forested vegetation conditions for goshawk closer to the desired conditions than alternatives 1 and 3. In 2035 the desired conditions for VSS distribution would be met and stands would be considered uneven aged. Graphs 1 to 4 show alternative 2 having the greatest improvement towards the desired condition VSS percentages for the FA but less desired for the PFA than alternative 3.

Natural meadows and openings would be maintained by removing conifers which have encroached upon these areas, post-European settlement. Quaking aspen and Gambel oak patches would be released or favored to develop. Understory grasses, forbs and shrubs would respond to these opened canopy conditions, and increase in abundance and vigor. Management would focus on favoring and regeneration of Southwestern white pine in locations where it currently exists.

Some effects of these treatments would be increased tree growth and favoring of the dominant trees within groups. Groups or stands currently classified as VSS 3 would be classed as VSS 4 and 5 post-treatment (resultant from favoring dominant trees for retention). Increasing the percentage of acres in the VSS 4 class allows for a greater number of residual trees for development into future VSS 5 and 6. These effects would occur in both the existing even and uneven-aged structured stands.

Enhanced vegetative ground cover would also improve forest soil nutrient cycling and stability (Dahms and Geils 1997). Forest regeneration is expected to occur within 5 years of the broadcast burning treatment. Within 10 years these openings would become VSS 1 and 2 tree groups. Due to the moderately-sized regeneration canopy gaps that would be created (average 0.33 to 0.75 acre), the site conditions would favor regeneration of shade intolerant species in ponderosa pine and mixed conifer stands. Broadcast burning is expected to reduce densities of the new regeneration but not eliminate it, due to the size of the canopy-free openings which would moderate fire effects.

Selected natural meadow locations would be maintained/restored to grassland or wet meadow by removal of all conifer trees (except VSS 6 tree groups and yellow-pine individuals).

Old Growth

Alternative 2 would exceed the forest plan percentages for old growth allocation within the project area, and would move the total district acres towards meeting the percentages for aspen, mixed species, and ponderosa pine. This alternative proposes allocating 7,852 acres with an existing large tree component and thinning to improve forest health, increase tree size growth, and reduce fire hazard. Stands proposed for thinning would develop towards old growth characteristics described in the forest plan, over time.

Treatment Longevity

Based upon proposed irregular spacing and creation of regeneration group openings, forest interspace, the uneven-aged forest character would persist for 30+ years following the initial treatment and longer if low-severity fire occurs at frequent intervals. Trees 5 to 9 inches dbh would develop interlocking crowns and closed forest canopy within the first one to two decades following treatment (based upon residual density ranges and average growth rates, Ronco et al. 1985); and tree groups in the 12 to 18 inch dbh range would remain closed canopy following treatment (based on treatment objectives). Seedlings and saplings up to 5 inches dbh would not fully occupy the created canopy gaps or develop to a height approaching the 2/3 of the general forest canopy until tree age 40-60 years, maintaining the canopy gaps during this period. Also the forest interspace would be maintained for a like period (indefinitely if low-severity fire occurs at frequent intervals). Therefore the desired

forest structure, biological diversity, and crown fire hazard reduction effects would be evident for at least 30 years following the proposed treatment.

Alternative 3-Modified

Alternative 3-Modified proposes to conduct commercial and non-commercial thinning using mechanical equipment. This alternative proposes management of forest density with strict consideration of the Large Tree Retention Strategy. Uneven-aged selection cutting to manage forest structure would be implemented to the extent possible under the constraints imposed by this alternative. MSO protected habitat stands would be treated the same under this alternative as described for alternative 2. Approximately 9,394 acres would be managed to develop towards forest plan old growth forest criteria, the same as for alternative 2. Stands which would only be broadcast burned or left untreated would be identical to alternative 2. Prescribed fire treatment objectives would be the same as described for alternative 2, but effects may be slightly greater due to a more closed canopy. Opportunities for timber or other biomass products would occur, and costs would be incurred for thinning and burning treatments under alternative 3-Modified.

Direct and Indirect Effects

Forest Health

Alternative 3-Modified moves the treated areas towards healthier forest conditions by restoring more vigorous growth conditions, and reducing losses due to tree mortality, wildfires, insects and diseases, relative to alternative 1. Alternative 3-Modified would be slightly less effective than alternative 2 for increasing forest health and vigor, uneven aged stand conditions, and forest resiliency to stresses such as insects, disease, and climatic variability.

Stand Density

Stand densities would be reduced in all of the harvest units, but the ability to reduce densities to desired conditions would be limited by the Large Tree Retention Strategy, and some stands or areas would not achieve desired density objectives. Based upon all forest stands (treated and untreated) 80% of northern goshawk habitat forest types (by area) and 75% of MSO restricted (other) habitat forest types (by area) are projected to meet desired maximum density conditions post-treatment.

Insects and Disease

This alternative is almost as effective as alternative 2 for reducing bark beetle hazard because overall BA is reduced; however, the creation of more even-aged larger tree sizes lends itself to bark beetles that prefer these stand conditions. In 2020, approximately 72% of the analysis area would be in the low hazard category. On 28 % of the analysis area beetle hazard remains high due to stands which would not receive mechanical treatments to reduce forest canopy. In these areas stand density would not be reduced enough to effect bark beetle hazard.

Dwarf mistletoe management treatments proposed under this alternative are the same as described for alternative 2, with the added constraints of the Large Tree Retention Strategy. As a result of these constraints, Due to lower treatment effectiveness, Alternative 3-Modified is less effective than alternative 2 for management of dwarf mistletoe and leaves the worst infections in the stands because the greatest infections are in the larger trees which are overtopping the younger tree groups in the stands.

Forest Structure

In this alternative, structural objectives would not be achieved because it is often difficult to create and place sufficiently-sized openings when silvicultural prescriptions are constrained by a tree size limit (Abella et al. 2006). It is very likely that Alternative 3-Modified would result in much fewer

canopy gaps/openings of sufficient size to achieve objectives than alternative 2 on 70% of the project area (55% uneven-aged forest, 15% mature even-aged forest, goshawk + MSO restricted habitats).

The forest vegetation spatial patterns would be different under this alternative than under alternative 2. The post-treatment tree distribution would be more uniform leading to more rapid canopy closure (5 to 15 years) of the forest as it develops post-treatment. Research has shown that diameter constraints maintain more tree canopy and result in more rapid in-growth of the canopy following treatments (Abella et al. 2006). The constraints of this alternative reduce opportunities to restore historic forest spatial patterns including regeneration openings and forest interspace (excluding MSO protected and recovery nest/roost, and goshawk nesting areas).

Forest Structure -MSO

In MSO protected habitat forest areas, where thinning is restricted to cutting trees up to a maximum 16 inches dbh, a reduction of excess density in understory trees would occur, but overall forest canopy cover and continuity would remain unchanged. Effects on forest health and vigor would be minimal as a result of these treatments, but minor improvements in the ability to implement and control prescribed fire treatments would be realized due to the reduction of ladder fuels.

In the recovery nest/roost habitat, broadcast burning appears to have dropped the minimum BA for the one stand that is being thinned. Stand prescriptions however would be written to meet the minimum BA requirement of 120 BA for mixed conifer. Basal area percentages themselves do not change and are the same as alternative 1 and 2.

Forest Structure - Goshawk

Alternative 3-Modified moves forested vegetation conditions for goshawk closer to the desired conditions than alternative 1. In 2035, VSS 3 and 4 are deficit while VSS 5 and 6 represent 70% of the landscape. In 2035 the desired conditions for VSS distribution would not be met and stands would be considered even-aged. Graphs 1 and 2 display Alternative 3-Modified moving away from the desired VSS classes with less improvement in the VSS 6 classes than alternative 2 and becoming unbalanced for the FA. Alternative 3-Modified would have a greater percentage in the VSS 4, 5, and 6 in the PFA but lacking in the VSS 3 due to thinning from below to 16 inches dbh.

Failure to achieve regeneration/development openings over 20% of the area results in the inability to implement the uneven-aged management strategy required by forest plan direction. Sustainability of uneven-aged forest characteristics cannot be achieved without effective creation of proportional regeneration areas. Over time, these conditions would result in domination of the site by the overstory trees, effectively creating or maintaining a functional even-aged, closed-forest condition. Additionally, failure to develop and restore forest openings would limit attainment of other ecological objectives, such as improving biological diversity and re-initiation of frequent surface fire.

Old Growth

Alternative 3-Modified would allocate the same amount of area for old growth management as alternative 2.

Treatment Longevity

Due to the small size of created openings and the current spacing of trees greater than 16 inches dbh most treated areas within the project area would quickly develop interlocking or nearly interlocking crowns within a relatively short time span following this treatment (less than 10 years), based on resulting density and average growth rates (Ronco et al. 1985). Continuous interlocking crown conditions inhibit regeneration, growth and vigor, reduce biological diversity, and greatly increase crown fire potential. Additional treatments would need to be considered within 10 years to reduce

fire hazard as a result of the interlocking canopy of trees. These treatments would need to include the removal of trees 16 inches dbh and larger which contribute to the interlocking canopy.

Cumulative Effects

The effects of alternative 1, 2, or 3-Modified when combined with the foreseeable treatments would not provide measurable cumulative effects.

Past Actions

Activities include timber sales, pre-commercial thinning, salvage sales and broadcast burning occurring within the boundary of the project area and were used in the vegetation cumulative effects. Existing stand densities are an expression of the cumulative effects of past vegetation modifying treatments as well as wildfires, even though wildfires are not actions considered in cumulative effects. Wildfires do have an effect on the current condition of the area. Past activities and wildfires that modified vegetation contributed to that VSS distribution and to the stand density percentages.

On-going present actions

Any tree removal within campgrounds, along State Highway 260, and along forest service roads is limited to imminent hazards from dead, dying and defective trees, which is not a significant change to the overall structure and composition of the area impacted and has been determined to have no measureable cumulative effect.

Future Actions

Future actions within the project area include mastication of trees within the powerline corridor of approximately every 5 years.

Wildlife

Existing Condition

A diverse assemblage of wildlife (threatened, candidate, sensitive, MIS, and Migratory birds) are known to occur or have habitat within or adjacent to the Larson project area. In some cases, surveys for these species have confirmed their presence in or near the project area. In cases where a species has not been detected, the presence of suitable habitat indicates they could be present and their presence was assumed under this analysis. The wildlife specialist report (2014) is located in the project record.

Wildlife Surveys

Wildlife surveys have been conducted in various parts of Larson since the late 1980s. Implementation-specific surveys to protocol began in 2014 and will continue through 2016, or longer based on implementation schedule.

Federally Listed Threatened, Endangered, and Proposed Species, and Proposed and Designated Critical Habitat

In addition to district files, the Apache-Sitgreaves National Forest/U.S. Fish and Wildlife Service Threatened & Endangered Species concurrence list dated September 20, 2013 (Appendix B) was referenced for development of the list of species that may occur or have suitable habitat within Larson. For the purpose of including these species for effects analysis, species that are known or have potential to occur within Larson are further analyzed, and species that are not present or do not have potential habitat in Larson are dismissed from further analysis as the project will have no affect to these species or their habitat (Table 19). Two species have the potential to occur within the Larson project area: the Mexican spotted owl (threatened with Critical Habitat) and the Mexican gray wolf (endangered, experimental non-essential population).

Table 19. Federally Listed Species on the Apache-Sitgreaves NFs and Species that are Analyzed or Dismissed from Further Analysis in the Project/Action Area.

Species Analyzed in Detail					
Common Name	Scientific Name	Known to Occur?	Potential to Occur?	Federal Status	Critical Habitat
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Yes	Yes	Threatened	Mexican spotted owl critical habitat was designated by the U.S. Fish and Wildlife Service in 2004. Approximately 21,360 acres of Larson fall within the critical habitat boundary with approximately 2,015 acres meeting the definition of MSO critical habitat and included within MSO stratified habitat acreages. Areas within designated critical habitat must be managed to maintain or enhance primary constituent habitat elements include criteria associated with the range of tree and plant species, canopy closure, snags, downed logs, and residual plant cover.
Mexican gray wolf	<i>Canis lupus baileyi</i>	No	Yes, random incident	Experimental/ Non-essential	None proposed or designated.
Species not analyzed in detail					
Common Name	Scientific Name	Known to Occur?	Potential to Occur?	Federal Status	Rationale
Little Colorado spinedace	<i>Lepidomeda vittata</i>	No	No	Threatened	No habitat or species present in or adjacent to analysis area.
Narrow-headed Gartersnake	<i>Thamnophis rufipunctatus</i>	No	Potential habitat occurs only in Willow Springs Canyon	Threatened with Proposed Critical Habitat	No habitat or species present in or adjacent to analysis area. Does not occur within the Little Colorado River Watershed.
Northern Mexican Gartersnake	<i>Thamnophis eques megalops</i>	No	No	Threatened with Proposed Critical	No habitat or species present in or adjacent to analysis area.

				Habitat	
Species not analyzed in detail					
Common Name	Scientific Name	Known to Occur?	Potential to Occur?	Federal Status	Rationale
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	No	No	Endangered	No habitat or species present in or adjacent to analysis area.
Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	No	No	Proposed Threatened with Proposed Critical Habitat	No habitat or species present in or adjacent to analysis area.
New Mexico meadow jumping mouse	<i>Zapus hudsonius luteus</i>	No	No	Endangered with Proposed Critical Habitat	No habitat or species present in or adjacent to analysis area.

Mexican Spotted Owl

Larson contains approximately 2,148 acres of MSO protected habitat within designated PAC's that are considered occupied (Table 2; Appendix A, Map 6). Recovery habitat is defined as areas outside of PACs that are managed as nest/roost, foraging, dispersal, and wintering habitats. Recovery habitat typically includes pine-oak, mixed conifer, and riparian forests as well as rocky canyons (USDI 2012).

Approximately 1,220 acres of MSO recovery habitat exists within Larson, of which 1,036 acres are mixed conifer forest and 184 acres are pine/oak forest (Table 1; Appendix A, Map 6).

Six MSO PACs have been established that exist entirely or partly within the analysis area (see Table 2). In addition to the six PACs within the Project Area, five other PACs fall within a ½ mile area around the Project Area (Appendix A, Map 6).

Environmental Effects

The following environmental effects section summarizes the analysis of the direct, indirect, and cumulative effects of each of the alternatives on the Mexican spotted owl and its designated critical habitat. A wildlife specialist report was prepared for the Larson Forest Restoration Project [PR #] that analyzes the effects of proposed action and alternatives in detail. Table 3 summarizes the determinations of effects for MSO and MSO critical habitat.

Alternative 1

Direct/Indirect Effects

No mechanical thinning or low severity broadcast burning to reduce fuel loading would be performed with Larson remaining at a high risk of stand replacing wildland fire. If a high severity active canopy wildland fire were to occur, it would alter habitat suitability for MSO. Mexican spotted owl habitats would not move towards recovery plan objectives and Forest Plan guidelines.

The effect of canopy openings, distribution of tree groups and clumps, and understory vegetation were analyzed for Fire Regime Condition Class in the Fire Specialist Report. A summary of results

for desired conditions and each alternative is displayed in Table 6. For FRCC, Alternative 1 would also represent current conditions for this landscape with all MSO habitats remaining in FRCC 3, at high risk of active crown wildland fire.

Alternative 2

Direct/Indirect Effects

Outside of the MSO nest core area, sound from chainsaws and other machinery used to thin trees/transport trees may disturb spotted owls that happen to be near the activity. Broadcast burning activities and the noise associated with burning such as vehicles, equipment, and line holding may disturb foraging owls.

Opening up the ponderosa pine stands, while maintaining a higher BA than those stands outside the PACs, will improve the value of these stands for foraging owls from adjacent nest/roost habitat.

Recovery nest/roost habitats would maintain a minimum 120 BA, where present, with the remaining area receiving an intermediate treatment removing the smaller trees to reduce undesirable fire risk and provide spatial arrangement for increasing remaining tree growth rates. No hardwood species would be removed, as they are limited in age class structure and are desirable for habitat components.

Mechanical treatments would occur on 31 acres or 5.5% of MSO recovery nest/roost stratified habitat in Larson. These areas would be treated by intermediate thinning of smaller trees to move towards structure goals and leaving majority of the larger, healthier trees to reach a minimum BA of 120. By removing the smaller diameter trees, an increase in health and vigor of the remaining larger dominant and co-dominant trees would be realized while reducing excessive undesirable fire risk.

Mechanical treatments would occur on 228 acres or 34% of MSO recovery foraging habitat in Larson. These areas would be treated by group selection to create openings that would regenerate ponderosa pine, white pine, and Douglas-fir in openings 1/4 to 2 acres in size (but generally from 0.25 to 0.75 acres) over 20% of the area, thus improving foraging habitat for MSO.

Low severity prescribed fire and mechanical treatment would occur within each of the six PAC's. This type of burning on 1,624 acres would not alter forest structure in the PACs, but would partially consume duff, dead and down material, and any herbaceous, forb, and browse. Providing additional buffer acres around the nest core habitat would minimize disturbance for prescribed fire holding. All PAC's that would be treated have buffers in place beyond the MSO Recovery Plan and Forest Plan guidelines.

Low severity prescribed fire would occur on 656 acres of recovery foraging habitat and 564 acres of recovery nest/roost habitat. A limited amount of mixed conifer and pine/oak recovery habitat would be treated to reduce surface dead fuel loadings to 8-16 tons per acre in mixed conifer, 7 – 14 tons per acre for ponderosa pine, and 5-10 tons per acre in the pine oak habitat. Prescribed burning in Recovery habitat would reduce duff accumulations and reduce smaller age class trees to encourage the growth of grasses, forbs, and shrubs, which are important to many MSO prey species.

Under Alternative 2, treatment restrictions within MSO PACs along with high density BA requirements in nest/roost recovery habitat would limit the ability to reduce canopy fuel continuity or for understory vegetation to respond to treatment. Areas in Protected, Nest/roost Recovery, and Recovery foraging habitat would remain as FRCC 3 or move to FRCC 2 in situations where some canopy can be affected without losing the desired BA.

Implementing Alternative 2 would manage for improved FRCC within MSO Recovery Habitat post treatment up to 20 years (Fire Specialist Report). Potential active and passive crown fire would be

reduced with the ability to manage wildland fire for resource benefit and maintenance treatments in the future.

Broadcast burning over much of the project area would remove accumulated duff and provide a flush of nutrients to the soil. Opening forest floor conditions and burning typically result in a renewed vigor in grasses and forbs. Conditions created by thinning followed by low severity prescribed fire are expected to improve the abundance and availability of deer mice and other prey species for MSO.

Mechanical treatments would reduce the potential for development of nesting habitat in some areas of recovery habitat. Activities associated with mechanical thinning and prescribed burning would be managed to retain PAC and Protected habitat structure and further develop threshold and target threshold habitats for future nesting habitats. Recovery habitat would be managed for long-term forest stand structure by implementing combinations of group selection cuttings arranged to spatially distribute vegetation structural stages and canopy openings that would release understory herbaceous and shrub communities and move towards Recovery Plan and Forest Plan guidelines. All five PAC's within Larson would receive a moderate short-term impact with thinning on 1382 acres, but it would occur outside of the breeding season, would be staged across several years, and provide a nest core buffer.

The nest core area would not be treated mechanically and only low intensity/low fire effects from prescribed fire would be allowed. Mechanical thinning and prescribed burning activities would provide for long-term future forest stand structure benefiting MSO habitats. This alternative has reduced the risk of high severity canopy fire in Recovery nest/roost, Recovery foraging, and old growth significantly more than Alternative 1.

Mechanical thinning and low severity prescribed burning would result in the forest understory being more open within the treated PACs. Low severity prescribed burning will not alter forest structure, as this treatment would primarily reduce duff and litter and minor component of young age class trees. This would increase understory vegetation following recovery that's desirable for MSO prey base and future maintenance treatments.

Treatments in recovery foraging habitat will provide for more canopy cover diversity, spatial arrangement for groups and clumps of stands with openings less than 2 acres to increase the understory vegetation component. Canopy cover would change slightly in recovery foraging habitat with development of un-even aged stand management. The excess of 12-18" dbh trees will be treated to move towards desired conditions of having a sustained level of MSO nest/roost habitat well distributed across the landscape while reducing potential for stand replacing wildland fires through MSO habitats.

Prey base habitat would be temporarily disturbed over the short-term with mechanical and prescribed fire treatments, but enhanced following forest understory vegetative recovery. By phasing the project activities, not all MSO habitats would be treated simultaneously thus lessening the impacts temporally.

Alternate 2 - Effects Analysis for MSO Critical Habitat

Approximately 2,786 acres of critical habitat meeting the definition of Protected or Recovery Habitat would be treated in Larson to maintain or enhance primary constituent habitat elements for Forest Structure and Prey Base. Canyon habitats would not be affected.

Direct/Indirect Effects

Design criteria and mitigation would be implemented to be compliant with Forest Plan (with amendments) and Recovery Plan Guidelines. Activities associated with mechanical thinning and broadcast burning would be implemented to minimize effects to MSO within PAC's by minimizing

treatments in the nest core (no mechanical treatments and burn only at low intensity with low effects) and only treating outside the breeding season. All protected, recovery nest/roost and recovery foraging habitats would be managed towards Forest Plan and Recovery Plan guidelines and would develop future nesting habitat.

Mechanical and broadcast fire treatments for PAC's, recovery nest/roost, and recovery foraging habitats would retain desirable tree canopy and meet or move towards BA objectives by reducing tree competition. Treatments in Recovery foraging habitat will provide for more canopy cover diversity, spatial arrangement for groups and clumps of stands, and minor openings to increase the understory vegetation component. Canopy cover would change slightly in recovery habitat with development of un-even aged stand management which equates to a range of 40% to 70% canopy coverage. The excess of 12-18" dbh trees will be treated to move towards desired conditions to have a sustained level of MSO nest/roost habitat well distributed across the landscape while reducing potential for stand replacing wildland fires through MSO habitats. Prey base habitat would be enhanced following forest understory vegetative recovery.

Alternative 3-Modified - Effects Analysis for MSO

Direct/Indirect Effects

In general, the direct and indirect effects of Alternative 3 on MSO would be the same as those described for Alternative 2 with the following exceptions. This alternative would reduce the risk of high severity canopy fire in recovery habitat more than Alternative 1.

Modeling of FRCC in Protected and Recovery habitats yielded only slight differences existing between the 2 alternatives when SDI and basal area are examined in post-treatment 2020 and 2035.

Due to size class limits, canopy cover would be slightly different in recovery nest/roost habitat with development of an even aged stand with retention of a range of 25 to 40% SDI (a reduction from 52%) which equates to a range of 40 to 70% canopy coverage. The excess of 12-18" dbh trees will be treated to move towards desired conditions to have a sustained level of MSO nest/roost habitat well distributed across the landscape while reducing potential for stand replacing wildland fires through MSO habitats. Treatment resulting in an even-aged stand would continue to be at a higher risk for active crown fire over Alternative 2. Prey base habitat would be enhanced following forest understory vegetative recovery for a shorter period of time than Alternative 2 due to increased canopy coverage over time.

Alternative 3-Modified - Effects Analysis for MSO Critical Habitat

Approximately 2,786 acres of critical habitat meeting the definition of Protected Habitat or Recovery Habitat would be treated in Larson to maintain or enhance primary constituent habitat elements for Forest Structure and Prey Base. Canyon Habitats would not be affected.

Effects analysis of Alternative 2 is similar to Alternative 3-Modified. Overall differences between Alternative 2 and Alternative 3-Modified would occur with canopy and vegetative understory over time due different methods of mortality on mistletoe infested trees.

The post-treatment tree distribution would be more uniform under Alternative 3-Modified without the clumpy and groupy stand arrangement in Alternative 2. Alternative 3-Modified forest structure and stand arrangement leads to more rapid canopy closure (estimated at 15 years) of the forest as it develops post-treatment (Silviculture Specialist Report). This rapid canopy closure has significant implications in Alternative 3-Modified that include increased wildland fire risk with an active crown

fire, more rapid movement towards FRCC 2 & 3, and a shorter period of maintenance of understory herbaceous and shrub community development that prey base depend upon.

Mexican Gray Wolf

The Mexican gray wolf (MGW) was reintroduced to the ASNF in 1998 as nonessential experimental under section 10(j) of the Endangered Species Act (50 CFR 17.84(k)). As such, these MGWs will be treated as a species proposed to be listed under section 4 of the Endangered Species Act. Only the Clifton, Alpine, and Springerville Ranger Districts are currently approved for wolf release/introduction sites. Black Mesa RD is not included within existing home ranges of known Packs. The FWS has proposed expanding the Recovery area which would include the Black Mesa Ranger District and would allow for the establishment of packs on the district.

CONSISTENCY WITH THE BIOLOGICAL AND CONFERENCE OPINION FOR THE CONTINUED IMPLEMENTATION OF THE LAND AND RESOURCE MANAGEMENT PLAN FOR THE APACHE-SITGREAVES NFS OF THE SOUTHWESTERN REGION U.S.D.A. FOREST SERVICE

The U.S. Forest Service (USFS) consulted on the continued implementation of the Apache-Sitgreaves LRMP in the Southwestern Region, and a final Biological and Conference Opinion (LRMP BO) was issued on April 30, 2012. Based on a review of the LRMP BO in relation to proposed project activities on Mexican spotted owl and Mexican gray wolf, implementation of the proposed alternative would be consistent with the Region-wide Programmatic LRMP Biological Opinion and no amendment to the LRMP would be necessary. A project specific, non-significant, Forest Plan amendment for managing MSO and MSO habitat was developed for the Larson project and is included at the end of this environmental assessment.

Table 20. Summary of Determinations of Effect for Threatened, Endangered, and Proposed Species and Designated and Proposed Critical Habitat.

Species	Determination of Effect ⁱⁱ		
	Alternative 1	Alternative 2	Alternative 3-Modified
Mexican Spotted Owl	NE	MANLAA	MANLAA
Critical Habitat for Mexican Spotted Owl	NE	MANLAA	MANLAA
Mexican Gray Wolf	NE	NLJ	NLJ

NE = No Effect MANLAA = May affect, not likely to adversely affect NLJ = Not likely to jeopardize the continued existence

Cumulative Effects for All Threatened, Endangered, and Proposed Species, and proposed and designated critical habitat

Development of private lands in Forest Lakes Estates is expected to continue. Forest Lakes Estates does not contain critical, recovery or protected Mexican spotted owl. Continued development of these properties may make them less suitable for MSO foraging. Recovery habitat adjacent to the private property may become less suitable for nesting or roosting. The loss of habitat in these parcels is negligible when compared to the amount of available habitat on surrounding national forest lands. Private land development is likely to attract more forest users to this area. Activities associated with an increase in nighttime recreation may cause some displacement to foraging spotted owls adjacent to the private property. Recreation in this area is not believed to have significant effects to Mexican spotted owl behavior.

Forest Service Sensitive Species

Sensitive species are defined as “those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species’ existing distribution (FSM 2670.5(19)).”

Existing Condition

The Black Mesa Ranger District utilized the Region 3 Regional Forester’s Sensitive Species List dated 2013 to assist with development of species that may occur or have suitable habitat within the Project Area for effects analysis or are not analyzed in detail based upon species occurrence or habitat in the project area (Table 21).

Table 21. Sensitive species analyzed or dismissed from further review for Effects Analysis in the Project Area.

SPECIES	SPECIES STATUS ON DISTRICT*	HABITAT DESCRIPTION	SPECIES STATUS IN ACTION AREA	HABITAT WITHIN ACTION AREA (ACRES)
Mammals				
<i>Corynorhinus townsendii pallescens</i> Pale Townsend’s Big-eared Bat	S?	Desertscrub, oak woodland, oak/pine, pinyon/juniper, and coniferous forests. Roosts in caves and mines from desert scrub up to woodlands and coniferous forests. Abandoned buildings, cold caves, lava tubes and mines.	Species not documented during surveys conducted by Petryszyn and Sidner (1994). Suitable habitat present in the form of caves where this species may roost and suitable foraging habitat.	30,041
<i>Euderma maculatum</i> Spotted Bat	S?	Desertscrub of all four North American deserts (Sonoran, Chihuahuan, Mohavean, and Great Basin) through riparian and pinyon-juniper to montane coniferous forests of Rocky Mountains, Sierra Nevadas and scattered ranges in between. Roost singly in crevices and cracks in cliff faces.	Species was not documented during surveys conducted on the Black Mesa Ranger District by Petryszyn and Sidner (1994). Roost and foraging habitat exists within and adjacent to the Project Area.	30,041

SPECIES	SPECIES STATUS ON DISTRICT*	HABITAT DESCRIPTION	SPECIES STATUS IN ACTION AREA	HABITAT WITHIN ACTION AREA (ACRES)
<i>Idionycteris phyllotis</i> Allen's lappet-browed bat	SB	Ponderosa pine, pinyon-juniper, Mexican woodland and riparian areas of sycamores, cottonwoods and willows, white fir and in Mohave desert scrub. Boulder piles, cliffs, rocky outcrops or lava flows. Roosts in caves and abandoned mineshafts.	Species has been documented at several sites on the Black Mesa Ranger District, including areas within a few miles south and east of the Project Area (Petryszyn and Sidner 1994). Snag and canyon roosting and foraging habitat exists throughout the project area.	30,041
<i>Microtus mogollonensis navaho</i> Navajo Mogollon Vole	S?	Dry, grassy situations, usually in areas adjacent to ponderosa pine, sometimes grassy areas in juniper woodland or stands of sagebrush, or as high as spruce-fir.	Surveys have not been conducted within the analysis area. Species has been documented six to ten miles north and west of the project area. Habitat exists within the Larson Project area.	401
Birds				
<i>Accipiter gentilis</i> Northern Goshawk	SB	Wide variety of forest types including deciduous, coniferous and mixed forests. Typically nest in mature or old-growth forests, commonly in ponderosa pine.	Goshawk surveys have resulted in the establishment of two goshawk post-family fledging areas (PFAs) within the Larson Project Area and two other PFAs within ½ mile of the boundary. Species and habitat present in EMA	30,041
<i>Falco peregrinus anatum</i> American Peregrine Falcon	SB	Steep, sheer cliffs overlooking woodlands, riparian areas or other habitats supporting avian prey species in abundance. Presence of an open expanse is critical. Sonoran, Mohave, and Great Basin desert scrub up through areas of Rocky Mountain and Madrean Montane Conifer Forest.	Two eyries just south of the Project Area. Project Area contains no suitable nesting habitat. Cliffs along the south and west of the Project Area are excellent habitat. Foraging habitat exists throughout the project area.	30,041

SPECIES	SPECIES STATUS ON DISTRICT*	HABITAT DESCRIPTION	SPECIES STATUS IN ACTION AREA	HABITAT WITHIN ACTION AREA (ACRES)
<i>Buteogallus anthracinus</i> Common Black Hawk	SB	Obligate riparian nester, dependent on mature, relatively undisturbed habitat supported by a permanent flowing stream. Groves of trees are preferred over single trees.	Species known to occur adjacent to the Larson Project Area. The project area is likely used by common black hawks for foraging.	30,041
<i>Haliaeetus leucocephalus</i> Bald Eagle	SB	Sonoran Riparian Scrubland and Sonoran Interior Strand, Sonoran Desertscrub biome-Arizona Upland subdivision, Interior Chaparral biome, and Great Basin Conifer Woodland biome. Rocky Mountain and Madrean Montane Conifer Forest. Nests usually on cliff ledges, rock pinnacles, and in cottonwood tree, but have been found in junipers, pinyon and ponderosa pines, sycamores, willows, snags.	No breeding bald eagles occur within the Larson project area. Bald eagles are known to breed approximately three miles west of Larson. Foraging and wintering habitat occurs throughout the project area and in adjacent areas. There are no known roost sites in or near the Project Area.	30,041
<u>Amphibians</u>				
<i>Lithobates pipiens</i> Northern Leopard Frog	Su	Grassland, brush land, woodland, and forest, usually in permanent waters with rooted aquatic vegetation; frequents ponds, canals, marshes, springs, and streams.	Surveys for leopard frogs have not been completed in the project area, but are planned for 2014. No observations have been made within or adjacent to the Larson Project Area.	150

SPECIES	SPECIES STATUS ON DISTRICT*	HABITAT DESCRIPTION	SPECIES STATUS IN ACTION AREA	HABITAT WITHIN ACTION AREA (ACRES)
		<u>Fish</u>		
<i>Catostomus</i> <i>sp. 3</i> Little Colorado Sucker		The Little Colorado River sucker occurs primarily in pools with abundant cover. Occurs within the upper Little Colorado River watershed, and their ranges and occurrences often overlap. Occupied habitat approximately 40 miles along Chevelon Creek and Leonard Canyon.	Willow Springs Creek is the only perennial creek within the Project Area; Little Colorado Sucker were found in Chevelon Canyon in 2005 approximately three miles north of the Project Area. All stream habitat located in Chevelon Creek downstream of the Project Area are considered for effects analysis.	1,100
<i>Gila robusta</i> Roundtail Chub		Slow moving, deep pools for cover and feeding; main stems of major rivers and smaller tributary streams; utilize silt, sand, gravel, and rocks and prefer murky water to clear; Juveniles and young-of-year found in quiet water near shore or backwaters with low velocity and frequent pools; juveniles use instream boulders for cover, while young-of-year are found in gaps between and under boulders or the slack-water area behind boulders; adults generally do not frequent vegetation and avoid shallow water cover types; adults are found in eddies and pools adjacent to strong current and use instream boulders as cover.	Only three populations are on the Apache-Sitgreaves NFs, and they occur in lower Chevelon Creek, Black River, and Eagle Creek. Habitat exists within Willow Springs Creek within the analysis area and in adjacent areas immediately outside the Project Area. All stream habitat within the project area and located in Chevelon Creek downstream of the Project Area are considered for this effects analysis.	1,100

SPECIES	SPECIES STATUS ON DISTRICT*	HABITAT DESCRIPTION	SPECIES STATUS IN ACTION AREA	HABITAT WITHIN ACTION AREA (ACRES)
		<u>Insects</u>		
<i>Capnia caryi</i> A Stonefly [Mogollon Snowfly]	S?	Found in only two high elevation locations in the southern Rocky Mountains of New Mexico and Arizona (Baumann and Jacobi, 2002). Found in two tiny creeks where substrate consisted of scattered boulders and a mixture of cobble with gravels. The gradient was 3% and the water was clear and cool, with low amounts of dissolved materials (Baumann and Jacobi, 2002). One population has been found in Arizona in Apache Co. (Mamie Creek at Escudilla Mountain); There are no documented findings of this species on the ASNF's.	Not documented within or adjacent to the action area but given the habitat and proximity to the Apache County population it is possible that this species could occur here. Willow Springs Creek is the only perennial creek within the Project Area; habitat exists within Chevelon Creek and Woods Canyon Creek immediately outside the Project Area. All stream habitat located in Willow Springs, Woods Canyon, and Chevelon Creeks downstream of the Project Area will be considered for effects analysis.	1,200
<i>Lepidostoma apache</i> A Caddisfly	S?	Found in freshwater habitat but the larval habitat is unknown. It is described from Arizona in the Blue River, on the ASNF's.	Not documented within or adjacent to the action area. Willow Springs Creek is the only perennial creek within the Project Area; habitat exists within Chevelon Creek and Woods Canyon Creek immediately outside the Project Area. All stream habitat located in Willow Springs, Woods Canyon, and Chevelon Creeks downstream of the Project Area will be considered for effects analysis.	1,200

SPECIES	SPECIES STATUS ON DISTRICT*	HABITAT DESCRIPTION	SPECIES STATUS IN ACTION AREA	HABITAT WITHIN ACTION AREA (ACRES)
<i>Lepidostoma knalli</i> A Caddisfly	S?	<i>Lepidostoma</i> larvae occupy cool water springs, streams and rivers, and occasionally occur in lacustrine habitats (Holzentha and Thompson, 2012, NatureServe 2013). It has been noted to occur in cool stream segments with generally swift flowing water, dominated by large cobbles with low embeddedness of interstitial gravels (Blinn 2006, Ruiter 2009).	This species is uncommon in Arizona. It has been found at two sites on the ASNFs. It has not been documented within the project area and its status there is unknown. Willow Springs Creek is the only perennial creek within the Project Area; habitat exists within Chevelon Creek and Woods Canyon Creek immediately outside the Project Area. All stream habitat located in Willow Springs, Woods Canyon, and Chevelon Creeks downstream of the Project Area will be considered for effects analysis.	1,200
<i>Limnephilus granti</i> A Caddisfly	S?	This species is extremely rare. All specimens have been collected from springs and their immediate outlets in the ponderosa pine region of eastern Arizona.	Known only from the type specimen and a few additional individuals. Has not been documented within or adjacent to the project area. No habitat occurs within the project area, but habitat occurs in springs within Chevelon Canyon. This will be considered for effects analysis.	0

SPECIES	SPECIES STATUS ON DISTRICT*	HABITAT DESCRIPTION	SPECIES STATUS IN ACTION AREA	HABITAT WITHIN ACTION AREA (ACRES)
		<u>Plants</u>		
<i>Helenium arizonicum</i> Arizona Sneezeweed	S	Ponderosa pine forests, especially around wet places such as bogs, ponds, lakes, and roadside ditches.	Has not been documented within the project area, but occurs just south.	18
<i>Heuchera eastwoodiae</i> Eastwood Alum Root	S	Rocky clay slopes on hillsides and along streams from chaparral up to ponderosa pine Forest.	Surveys have not been conducted and the species has not been documented in the project area. The Heritage Data Management System documents an observation less than one mile from the project area.	29,494
<i>Huechera glomerulata</i> Arizona Alum Root	S?	Shaded rocky slopes in humus soils near seeps, streams, and riparian areas.	Surveys for Arizona alum root have not occurred and the species has not been documented within the Larson Project Area. Habitat exists within the Project Area.	29,494
<i>Helianthus arizonensis</i> Arizona sunflower	S?	Dry, frequently sandy soils between 4,000 and 7,000 feet.	Surveys for Arizona sunflower have not occurred and the species has not been documented within the Larson Project Area. Suitable habitat occurs.	30,041
<i>Rumex orthoneurus</i> Blumer's Dock	S	Mid- to high-elevation wetlands with moist, organic soil adjacent to perennial springs or streams in canyons or meadows.	Blumer's dock has been documented in Willow Springs Canyon within the Project Area and found elsewhere in the Black Mesa Ranger District.	419

SPECIES	SPECIES STATUS ON DISTRICT*	HABITAT DESCRIPTION	SPECIES STATUS IN ACTION AREA	HABITAT WITHIN ACTION AREA (ACRES)
<i>Salix bebbiana</i> Bebb's Willow	S	Along riverbanks, streambanks, overflow channels, and seeps in chaparral to high-elevation coniferous Forest.	Surveys for Bebb's willow have not occurred within the Larson Project Area and it has not been documented here. The closest extant populations occur approximately three to four miles southeast of the Project Area.	500
<i>Phlox amabilis</i> Arizona Phlox	S?	Arizona phlox is found on open, exposed, limestone-rocky slopes within pinyon-juniper woodlands and pine-oak communities at elevations between 3,500 to 7,800 feet.	Surveys for Arizona phlox have not occurred and the species is not documented within the Larson Project Area. Suitable habitat exists within the Project Area.	449

* Key to Status of Species on District: S = Presence of species documented and likely still occurs

SB = Breeding of species documented

Su = Historic presence of species documented, but current status uncertain

S? = Presence of species not documented on district but may occur due to presence of suitable habitat

PT = Proposed Threatened

Environmental Consequences

Individual Sensitive Species are analyzed for effects and determinations of the No Action (Alternative 1), Proposed Action (Alternative 2), and Modified Proposed Action (Alternative 3) considering existing conditions, life history and affected habitats, and cumulative effects.

Alternative 1

The No Action Alternative effects apply to all sensitive species as if no treatments are being implemented. The following No Action Alternative Effects Analysis applies to each Sensitive Species being analyzed in Table 13.

Direct and Indirect Effects:

Alternative 1 would not result in an immediate change to the quantity or quality of habitat used by any of the Sensitive Species. Forested habitat (29,507 acres) would continue to be overstocked and shade out understory. Meadow and grassland habitats would continue to receive conifer encroachment over time. The Forested Habitat within the Project Area would remain within the FRCC 3 level and be at a higher risk of stand replacing crown wildfire (Fire Specialist Report). Roads would not be decommissioned or rehabilitated thus continuing to negatively affect water quality and watershed function.

Cumulative Effects:

There would be no cumulative effects associated with this alternative because there is no effect from this alternative.

Determination of Effects:

Based on the above discussion, it is my determination that Alternative 1 (no action) for the Larson Forest Restoration Project would have no impact to the Sensitive Species identified in Table 21.

Impacts Common to All Forest Sensitive Species

Pale Townsend's Big-eared Bat *pallascens*)

(*Corynorhinus townsendii*

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects

Tree thinning activities are not likely to affect Pale Townsend's big-eared bat roosting habitat because these bats generally roost in caves. Under the Proposed Action, all known caves would be buffered from thinning treatments within 300 feet of the cave. This would eliminate the potential for damage to the cave from mechanized equipment or increased sedimentation and would eliminate disturbance to Townsend's bats if they are roosting in caves. Prescribed burning occurring when bats are rearing young (April –July) or in deep hibernation (mid-winter) can have negative effects on local populations; however, most prescribed burning would occur in the fall.

Thinning and prescribed burning activities would indirectly affect bats through the disturbance or removal of understory vegetation, which would subsequently alter the composition and abundance of insect prey. These effects would be short-term and would be minimized due to activities being temporally and spatially separated. In contrast, reducing canopy closure, removing trees in and at edges of meadows, restoring meadows, and prescribed burning would encourage the development of understory vegetation and increase the amount of edge. These would all aid in the increased availability of food for the bat over the long-term. Indirect benefits could potentially result from restoring meadows encroached by pine trees and reducing uncharacteristic tree densities and patterns in the ponderosa pine forest resulting from fire exclusion. These efforts would aid in restoring openings and edge habitat within the forest and improving understory vegetation that would benefit pale Townsend's big-eared bats and their prey.

Spotted Bat

(*Euderma maculatum*)

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects

Tree thinning activities are not likely to affect spotted bat roosting habitat because these bats typically roost in cracks and crevices of cliff faces. Most of the cliffs in the vicinity of the Project Area only exist immediately adjacent to the project area in Chevelon Canyon. Cliffs and rock outcroppings would not be affected by tree thinning. Prescribed burning occurring when bats are rearing young (April –July) or in deep hibernation (mid-winter) can have negative effects on local populations; however, most prescribed burning would occur in the fall.

Thinning and prescribed burning activities would indirectly affect bats through the disturbance or removal of understory vegetation, which would subsequently alter the composition and abundance of insect prey. These effects would be short-term and would be minimized due to activities being temporally and spatially separated. In contrast, reducing canopy closure, removing trees in and at edges of meadows, restoring meadows, and prescribed burning would encourage the development of understory vegetation and increase the amount of edge. These would all aid in the increased availability of food for the bat over the long-term. Indirect benefits could potentially result from restoring meadows encroached by pine trees and reducing uncharacteristic tree densities and patterns in the ponderosa pine forest resulting from fire exclusion. These efforts would aid in restoring openings and edge habitat within the forest and improving understory vegetation that would benefit spotted bats and their prey.

Allen's Lappet-Browed Bat

(Idionycteris phyllotis)

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects

Thinning and prescribed burning activities could potentially disturb bats roosting in trees within the treatment areas. The removal of snags would reduce suitable and potentially existing roost sites, thereby decreasing the amount of roosting habitat available to this species. Most bats would likely relocate to snags existing outside of log landing areas; however, if snags are removed from log landing areas during the spring, summer, or fall, mortality to individual lappet-browed bats or small maternity colonies could occur. In some cases, whole stands of mistletoe infected trees would be removed under a shelterwood cut with reserves. While these treatments would reduce potential snags, the consequent openings would provide for more understory herbaceous cover resulting in higher quality foraging areas for the bats.

Prescribed burning occurring when bats are rearing young (April –July) or in deep hibernation (mid-winter) can have negative effects on local populations; however, most prescribed burning would occur in fall. Prescribed burning may also result in the loss of individual snags which could affect roosting bats; however this impact would be reduced through the creation of additional snags and mitigation that includes managing for retention of all snags 18” diameter. Cliffs, rock outcrops, boulder piles, and other structures would not be affected by tree thinning and burning activities.

Thinning and prescribed burning activities would indirectly affect bats through the disturbance or removal of understory vegetation, which would subsequently alter the composition and abundance of insect prey. These effects would be short-term and would be minimized due to activities being temporally and spatially separated. In contrast, reducing canopy closure, removing trees in and at edges of meadows, restoring meadows, and prescribed burning would encourage the development of understory vegetation and increase the amount of edge. These would all aid in the increased availability of food for the bat over the long-term. Indirect benefits could potentially result from restoring meadows encroached by pine trees and reducing uncharacteristic tree densities and patterns in the ponderosa pine forest resulting from fire exclusion. These efforts would aid in restoring openings and edge habitat within the forest and improving understory vegetation that would benefit spotted bats and their prey.

Effects Analysis – Alternatives 2 and 3-Modified**Direct and Indirect Effects:**

Tree thinning, broadcast burning, and road construction and maintenance could result in injury or mortality of individuals. Most meadows and open grassy areas would be either undisturbed or lightly disturbed by tree thinning and associated vehicle traffic. Skidders and other equipment could run over nests, causing harm or disturbance to individual voles. Grassy areas have the potential to be created during shelterwood with reserves harvests in Alternative 2, which would increase potential habitat for the vole until a new canopy establishes.

Navajo Mogollon voles could be injured and/or killed during broadcast burning activities since they do not seek shelter in underground burrows. Low severity broadcast burning is also likely to negatively affect above ground foraging habitats through the temporary removal of herbaceous materials. However, fire exclusion has resulted in uncharacteristically dense forests and meadow and grassland encroachment. This has caused a reduction in herbaceous cover and food for the Navajo Mogollon vole across the Project Area. Burned habitat and herbaceous cover are expected to recover by the late spring and summer and it is anticipated that meadows and open areas would rebound afterwards, with more vigorous herbaceous vegetation and healthier understory habitats. Benefits from maintenance treatments would include management towards VSS Class distribution objectives and increased understory herbaceous and browse species that would benefit the Navajo Mogollon vole.

Restoring meadows and creating openings in the forest would increase potential understory development, including bunch grasses and other C-3 plants providing preferred food sources. These openings would provide both habitat connectivity and habitat stepping stones facilitating landscape movement. Moving these habitats towards historic conditions could increase potential habitat quality and quantity and reduce the risk of uncharacteristic, high-severity wildfire. The reduction of ponderosa pine basal area, increased growth in the understory vegetation on the forest floor, and increases in snags would result in indirect beneficial impact to the vole.

Northern Goshawk**(*Accipiter gentilis*)**

Action Alternatives 2 and 3-Modified would move the VSS balance toward desired conditions through a combination of silvicultural treatments and prescribed burns designed to create the specific habitat features and characteristics put forth in the Forest Plan for northern goshawks.

Alternative 2**Direct and Indirect Effects**

Implementing a breeding season timing restriction for activities occurring within goshawk PFAs would eliminate most of the potential for direct effects to goshawks from all of the proposed activities. When territories are monitored and found to be unoccupied, the breeding season timing restriction may be suspended for that particular season. Unintentional disruption of normal foraging patterns could occur to foraging northern goshawk adults outside of PFAs during felling, chipping, piling, road maintenance and broadcast burning activities. This disruption should be limited in scope, as treatments would be approximately 6,000 acres in any given year throughout the Project Area.

To decrease the risk of losing northern goshawk habitat to high severity wildfire, PFA's and nest stands would be treated either mechanically and/or with low severity broadcast fire following Forest Plan guidelines. Existing nest stands have a high canopy cover of mature to old age trees and these

conditions would be maintained. No VSS 6 tree groups would be thinned. In PFA's and Foraging Areas, group selection would be used to regenerate ponderosa pine, white pine, and Douglas-fir in openings (1/4 to 4 acres in size). Openings would be developed within excess VSS classes and/or diseased patches (generally within VSS 3 and 4 areas). If present, groups or stringers consisting of a minimum of three to five mature and old, live trees per acre with interlocking crowns will be left. Tree groups would be maintained by VSS class, ranging from 1/4 to 1 acre in size and generally in groups of 4 to 20 trees (1/10 acre basis). VSS percentages will be distributed according to Forest Plan guidelines. Residual stand density would vary, but would average 50-70 square feet of basal area per acre in foraging areas, and would average 70-80 square feet within PFAs. Where stands structures are predominantly even-aged, the stand would be thinned in an irregular-density fashion, striving to create groups and clumps of residual trees. Desirable dominant and co-dominant white pine and ponderosa pine would be left as single trees or groups throughout the area. Thinning within PFAs is expected to result in a clumpy distribution of all-aged trees which would create more open conditions while still providing sufficient cover to fledgling goshawks and follow canopy coverage guidelines.

Alternative 2 would preserve current old growth habitat and develop old growth components in designated stands within northern goshawk stratified habitats on 6,793 acres. Old growth wildlife habitat would increase as designated stands increase in maturity over time.

Mechanical treatments in aspen stands would improve the quality of the aspen habitat for goshawk prey species including the red-naped sapsucker.

Low severity broadcast burning would occur throughout the stratified habitat. A fall and winter burning period would reduce any impact to nesting and fledgling goshawks from broadcast burning activities and smoke as burning would only occur outside the sensitive reproductive season. Resident goshawks would be able to move beyond smoky areas during the fall burning season and still be in or near their respective PFAs. Broadcast fire is recommended in ponderosa pine and mixed-species forests to perpetuate northern goshawk habitat and to reduce fuel loading (Reynolds et al. 1992).

Small openings would be created within the forested areas to provide more sunlight to the forest floor thereby increasing grasses, forbs, and shrubs. Low severity broadcast fire would result in a mosaic of burned, partially burned, and unburned duff layers. Herbaceous plant growth would increase in areas where a thick layer of dead plant material has accumulated over time and is burned off during treatments. The increase in herbaceous plants and shrubs should result in additional forage and cover for goshawk prey species such as cottontails, golden mantled ground squirrels, and mourning doves.

Maintenance low severity broadcast burning would occur every two to ten years, so impacts associated with the initial broadcast burn treatments would reoccur. Benefits from maintenance treatments would include management towards VSS Class distribution objectives and increased understory herbaceous species that would benefit northern goshawk prey.

The existing road system within the analysis area would receive higher vehicle use than currently occurs. Existing roads would be used for transporting crews to and from work sites, hauling materials from work sites, and as control lines for broadcast burning. Activities could occur during any time of the year but would not affect the entire project area all at once. Projects would be implemented in stages, affecting different areas at different times. Higher use of the road system could result in higher levels of noise, visual, and dust disturbance to goshawks. Grubb et al. (1998) found that logging trucks passing within 413 m of an active goshawk nest did not elicit any behavioral response from a brooding female goshawk.

Timing restrictions in PFAs and nest stands would reduce the effects of road use in breeding areas during the breeding season. Foraging habitat outside of PFA's could be affected year-long and could cause goshawks to avoid foraging in areas where vehicle traffic associated with treatment activities is

high. Approximately 4,363 acres of foraging areas would not be mechanically treated, which would provide areas for undisturbed foraging.

The Forest Plan includes direction to establish dispersal PFAs at 2 to 2.5 mile spacing across the landscape where active goshawk territories are absent. Two dispersal PFAs have been established in the Project Area with these areas being managed according to Forest Plan direction.

With approximately 99 goshawk PFAs established on the ASNF, a potential impact to the reproductive success of two active PFAs associated with the Project Area would not cause a measurable change to the Forest-wide goshawk population trend. The quality of habitat across the Project Area would improve and move towards improving habitat quality Forest-wide.

Due to spatial arrangement of tree groups and clumps, there will be a marked reduction in passive crown fire for both PFA/nest and foraging habitat.

Alternative 2, Mid-scale Outside of PFA/Nest area stratum

Implementing Alternative 2 will move existing stand VSS distributions towards a more balanced distribution of age classes. This alternative improves the size class balance over current conditions by favoring larger age classes, the VSS 1 regeneration openings (as occurring in each VSS class through clumpy/groupy tree distributions), and the VSS 2 seedlings and saplings. The reduction from current age classes is taken from the current VSS 3 and 4 categories. Alternative 2 moves all treated even aged stands towards uneven aged stands thus increasing structural diversity, and moves all treated uneven-aged stands towards a desired distribution of balanced VSS structural classes.

Alternative 2, Mid-scale in PFA stratum

Implementing Alternative 2 will move existing stand VSS distributions towards a more balanced distribution of age classes. Alternative 2 will move current VSS 3 from 48.1% to 20.3%, VSS 4 from 16.2% to 19.8%, and VSS 6 from unrepresented to 11.6%. Alternative 2 moves all even aged stands towards uneven aged stands thus increasing within stand structural diversity.

Alternative 2, Project scale of all goshawk habitat

Implementing Alternative 2 will move existing stand VSS distributions towards a more balanced distribution of age classes as defined above. The VSS 2 class will move from 3% to 0%, VSS 3 from 57% to 7%, VSS 4 from 26% to 51%, VSS 5 from 12% to 23%, and VSS 6 from 2% to 19%. This improvement towards a VSS structural size class balance over current conditions is easily seen for VSS 4, VSS 5, and VSS 6.

The VSS 3 can be considered slightly improved or less departed from current conditions. For VSS 3 the shift necessary to attain the desired 20% from current conditions is a decline of 37%. The Alternative 2 residual VSS 3 of 7% is a departure of 13% less than the desired 20%, therefore VSS 3 is closer to the desired VSS distribution than current. For VSS 5 the shift necessary to attain the desired 20% from current conditions is an increase of 8%. The Alternative 2 residual VSS 5 is a departure of 3% from the desired 20%, therefore VSS 5 is moving away from the desired VSS distribution. The significant reduction in VSS 3 largely reflects favoring older aged structural attributes found in VSS 5 and VSS 6 such as no treatment in existing VSS 6 group conditions and using VSS 3 to move towards desired VSS 1 and VSS 2 proportions in the desired balance of size class. Alternative 2 moves all even aged stands towards uneven aged stands thus increasing structural diversity.

Alternative 2 - Forest Plan Consistency

This alternative has improved the conditions in the Project Area to reduce high severity crown fire within treated acres for 30 years by reducing FRCC surrounding northern goshawk habitat (PFA/Nest, Foraging) as compared to Alternative 3 discussed below. If a high severity canopy fire occurred, it would destroy perching, nesting and foraging habitat in the Project Area.

Alternative 3-Modified

Direct and Indirect Effects: The effects analysis from Alternative 2 applies under this alternative with a few exceptions. Differences in the effect analysis result from the retention of large trees (following the Large Tree Retention Strategy). In Alternative 3-Modified, large trees would be retained across the mechanical treatment area regardless of dwarf mistletoe infections. This would result in more large trees across the landscape and a more even-aged vegetation structure. Even-aged stand structures reduce the vertical diversity of a stand and do not provide for the range of conditions necessary to support a diverse suite of prey for the goshawk. This alternative proposes to not treat only 2% of the Project Area through shelterwood cuts with reserves would, therefore, not result in a large impact to the northern goshawk

Mistletoe infected trees have the potential to increase the threat of stand replacing wildfire within the Project Area. Mistletoe infection promotes resin production and increases litter accumulation. Infected trees also retain brooms and infected branches, which form a fuel ladder from the ground to the canopy (Alexander and Hawksworth 1975). Should high severity canopy fire occur, it would destroy northern goshawk breeding and foraging habitat. However, where areas experience only Low to moderate severity burns, there would be an increase in herbaceous vegetation over time, thus providing more foraging habitat for the northern goshawk.

Alternative 3-Modified, Mid-scale Outside of PFA stratum

Implementing Alternative 3 will move existing stand VSS distributions towards VSS classes representing older aged structural stages. This alternative was designed to retain all large trees regardless of mistletoe infection as required in the large tree retention strategy (USDA 2011). Size class reductions from current are predominantly taken from the VSS 3 category. This reduction is primarily shifted to gains in VSS 4, 5, 6 classifications. Alternative 3 moves all uneven aged stands towards even aged stands thus simplifying within stand and structural diversity.

Alternative 3-Modified, Mid-scale in PFA stratum

Implementing Alternative 3 will move existing stand VSS distributions toward desired conditions. Both the VSS 2 and VSS 3 classes decrease significantly and the VSS 4 class increases. This alternative was designed to retain all large trees regardless of mistletoe infection as required in the large tree retention strategy (USDA 2011). Size class reductions from current are predominantly taken from the VSS 3 category, and added to the VSS 4 and 6 classifications. Alternative 3 moves all uneven aged stands towards even aged stand conditions, thus simplifying within stand structural diversity.

Alternative 3-Modified, Project-scale of all goshawk habitat

Alternative 3 will move existing stand VSS distributions towards older aged structural stages. The VSS 2 class will remain at 0%, VSS 3 from 57% to 9%, VSS 4 from 26% to 48%, VSS 5 from 12% to 31%, and VSS 6 from 2% to 12%. This alternative was designed to retain all trees greater than 16 inches and this diameter limit threshold lies within the upper range of VSS 4. This Alternative does not change VSS 1 or VSS 2 from current. It decreases the percentage of VSS 3 by 48%, and increases VSS 4 by 22% from current conditions. It increases the percentage in VSS 5 by 19% and VSS 6 by 10%. The decline in VSS 3 reflects favoring larger size classes (VSS 5, VSS 6) because of the 16 inch

diameter threshold for retention. The increases in VSS 5 and VSS 6 are also because of the 16 inch diameter threshold for retention. Alternative 3 moves all uneven aged stands towards even aged conditions.

Alternative 3-Modified, Forest Plan Consistency - This alternative would meet the northern goshawk recommendations and would move the stratified habitat towards a more even distribution of VSS Classes over time. This alternative provides for sustainability with maintenance treatments that would create regeneration openings and improve the primary prey base habitat structure improving the quality of habitat.

Comparison of Alternative 2 and Alternative 3-Modified, Project-scale of all goshawk habitat

Alternatives 2 and 3 both contain 22% of the total goshawk habitat in the Project Area that will not be treated. A comparison of Alternative 2 and Alternative 3 VSS classes for the Project-scale shows the VSS 3 class to be 7% and 9% respectively. The VSS 4 class is 51% and 48% for Alternative 2 and 3 respectively. The VSS 5 class is 23% and 31% respectively, and the VSS 6 class is 19% and 12% respectively.

Comparison of Alternative 2 and 3-Modified, Mid-Scale Outside of PFA/Nest area stratum

A comparison of Basal area as a measure of density shows Alternative 1 currently at 150 ft²/acre for the Outside of PFA/Nest area stratum. Alternative 2 reduces this to 89 ft²/acre and Alternative 3 reduces this to 96 ft²/acre. Alternative 3-Modified treatments carry more BA than Alternative 2 by 7 ft²/acre.

Comparison of Alternative 2 and Alternative 3-Modified, Mid-Scale PFA stratum

A comparison of Basal area as a measure of density shows Alternative 1 currently at 163 ft²/acre within the PFA/Nest area stratum. Alternative 2 reduces this to 114 ft²/acre and Alternative 3-Modified reduces this to 98 ft²/acre.

It is important to note that these BA averages are density representations at the compartment level and include regeneration gaps and other stand level openings at the Mid-scale for both strata and at the Project-scale. It is also important to note that to achieve fuel treatment effectiveness, the BA must be reduced but the spatial arrangement of residual trees influences the fuel reduction effectiveness. Alternative 2 is designed to provide a spatial arrangement of groups and clumps of residual trees with interspaces that separate tree crowns between groups and clumps. This provides reduced probability of crown fires at large scales and provides more years of protection than Alternative 3-Modified. Alternative 3-Modified provides improvement in fuels conditions, but the effectiveness is lost in approximately one-half the time that Alternative 2 provides.

Comparison of Alternative 2 and 3-Modified Basal Area, Project-scale of all goshawk habitat

A comparison of Basal Area as a measure of density shows Alternative 1 currently at 151 ft²/acre at the Project-scale of evaluation. Alternative 2 reduces this to 93 ft²/acre and Alternative 3 reduces this to 97 ft²/acre. Alternative 3 treatments carry more BA because of the removal of trees less than 16 inches in diameter with the remaining BA is in larger size trees 16 inches or greater, and fewer regeneration canopy gaps for VSS 1, and VSS 2. Both action alternatives have lower BA values than Alternative 1 because both alternatives remove significant amounts of BA to achieve project objectives. Alternative 1 has BA values that are above historic conditions and does not address the problem of reducing and arranging fuels to reduce large scale high intensity fires and effects that are not desired.

Direct and Indirect Effects of Alternatives 2 and 3-Modified - Snags

Snags are considered to be a valuable habitat component in any landscape. They provide living space for dens and roosts as well as foraging habitat for many bird and mammal species. Alternatives 2 and 3-Modified would initially decrease the amount of snags in foraging habitat. This is contrasted by the initial increase in snags within the PFAs. Considering that the PFA is the primary foraging area immediately surrounding the nest area, this increase in snags closer to the nest may provide additional habitat for those prey species associated with snags. The snags created in the action alternatives would predominantly be created through the mortality associated with prescribed burning.

Forest Plan Guidelines require 2 snags per acre, which is currently above the existing conditions. According to stand exam data, snag densities are currently below Forest Plan guidelines throughout the stratified habitat. There are minimal differences between the PFA/Nest area and Out of PFA/Nest area (Mid-scale) strata. This data does not display any difference between Mid-scale and Project Area (landscape-scale) snag densities. Project design features have been identified to address the shortage of snags at desired levels for both action alternatives.

Direct and Indirect Effects of Alternatives 2 and 3-Modified - Dead/Down Logs

Logs are considered an important habitat feature for prey species as not only living habitat for dens and cover but also as foraging habitat. All of the alternatives increase the amount of logs. Logs will be recorded at approximately 2,326 plots during northern goshawk surveys in 2014 and 2015 covering 45,456 acres and included the majority of stratified habitat areas within the Project Area and habitat outside the Project Area (Table 6). Both action alternatives contain design criteria to retain at least three downed logs per acre, and 5-7 tons of woody debris per acre.

American Peregrine Falcon *anatum*)

(*Falco peregrinus*

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects:

To prevent project-related disturbances, implementation of project activities within the primary management zone would be restricted to periods outside the peregrine falcon breeding season.

Mechanical treatments, prescribed burning, hauling of timber and other project activities may cause visual or auditory disturbance to foraging peregrine falcons. This disturbance would be localized, of short duration and low intensity and may affect individual birds but would not affect the overall distribution or reproduction of the species.

A fall and winter burning period would reduce any impact to nesting and fledgling peregrine falcons from broadcast burning activities and smoke as burning would only occur outside the sensitive reproductive season. Fire and smoke effects from broadcast burning may disturb individual birds outside of the breeding season but this should be short-term impact and would not adversely affect peregrine falcon due to implementing a low severity prescription. The loss of snags from burning could reduce available foraging and nesting habitat for swallows and other songbirds, which are identified prey species.

Benefits from maintenance treatments would include management towards VSS Class distribution objectives and increased understory herbaceous species that would benefit peregrine falcon prey. Peregrine falcon foraging habitat will be altered in some areas by thinning and prescribed burning activities. Prey populations may be affected by changes in tree densities, canopy closures, and ground cover. Thinning treatments in the Project Area is expected to result in more open stands but are not expected to change small bird abundance significantly.

Common Black Hawk

(Buteogallus anthracinus)

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects: Common black-hawks are unlikely to be directly affected by the proposed action. Mechanical treatments would not occur in suitable black-hawk nesting and foraging habitat due to steep slopes and restrictions associated with Mexican spotted owl habitat. Broadcast burning could be implemented in foraging habitat but it would take place in the fall after black-hawks have migrated from the area.

Streamside buffers for mechanical and broadcast fire treatments would provide filter strips based on soil type. Perennial, intermittent, and ephemeral drainage buffers would not be entered by skidders or other vehicles and mechanical operations outside of streamside buffers would occur only during dry and frozen ground conditions.

A fall and winter burning period would reduce any impact to nesting and fledgling black hawks from broadcast burning activities and smoke as burning would only occur outside the sensitive reproductive season. Fire and smoke effects from broadcast burning may disturb individual birds outside of the breeding season but this should be a short-term impact and would not adversely affect common black-hawks. Timing restrictions within PFAs and PAC's would further reduce impacts during the breeding season within portions of the Project Area if occupied.

Bald Eagle

(Haliaeetus leucocephalus)

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects

There is no effect to nesting eagles since no nests occurs within the project area; however, short-term disturbance to foraging bald eagles would occur during mechanical thinning, operation of logging and chipper trucks, broadcast burning, and road maintenance operations. Commercial tree thinning could cause the felling of undetected winter roost trees. Some large snags that could be used for perching would be removed within landings. Low severity broadcast fire may create additional snags following treatments.

A fall and winter burning period would reduce any impact to nesting and fledgling bald eagles adjacent to the Project Area from broadcast burning activities and smoke. Fire and smoke effects from broadcast burning may disturb individual birds outside of the breeding season but this should be a short-term impact. Low severity broadcast fire is not expected to change the availability of bald eagle perch sites although some live large trees could be killed by the activity, reducing the life expectancy of some possible perch sites. Treatment objectives are designed to leave at least two snags per acre in ponderosa pine and three snags per acre in mixed conifer stands, which would provide sufficient snag numbers for the needs of bald eagles.

The existing road system would experience increased use during project implementation. Bald eagles perching and foraging in an area of the project with active treatments, or along roads that are being used in connection with treatments, may be disturbed from perching or carrion feeding sites. This disturbance would most likely be limited to fall and possibly winter months when bald eagles are present in this area and would affect only a fraction of the total project area at any one time.

There are no anticipated adverse effects to prey species or prey species habitat. Indirect effects to habitat would occur from treatments that modify the number of trees in a group of suitable roost trees, as eagles prefer to roost in large trees within close proximity to other large trees. However, thinning

would improve old tree longevity. Snags would slightly increase post treatment and continue to increase in the long term.

Benefits from treatments would include management towards VSS Class distribution objectives and increased understory herbaceous and browse species that would benefit bald eagle prey.

This alternative will improve the conditions in the Project Area to reduce high severity crown fire within treated acres for up to 30 years by un-even aged stand management with clumpy and groupy tree stands with regeneration openings (Fire Specialist Report). If a high severity canopy fire occurred, it would destroy perching, nesting, and foraging habitat in the Project Area.

Northern Leopard Frog

(*Lithobates pipiens*)

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects

Northern leopard frogs may be killed during project activities if caught outside of the wetland zone during thinning or prescribed burning. Northern leopard frogs likely take refuge in emergent vegetation of wetland habitats or under water. Northern leopard frogs are highly mobile; however, they risk desiccation if they escape into areas where a nearby water sources do not exist.

Thinning and prescribed burning will initially result in less favorable conditions for amphibians due to a reduction of understory vegetation and downed woody debris. This loss of important amphibian cover can result in exposure to extremes in temperature and desiccation thereby elevating risk of predation or physiological stress (Pilliod et al. 2003).

The existing road system would experience increased use during project implementation. Higher use of the road system could result in the interruption of dispersal or direct mortality of northern leopard frogs. This disturbance would most likely be limited to fall and possibly winter months when leopard frogs are hibernating and would affect only a fraction of the total project area at any one time.

Wetlands may provide refuge from fire and breeding activities may be carried out with little interruption (Smith 2000); however, thermal stress or rapid changes in water chemistry may result in mortality of adult and larval amphibian populations of northern leopard frogs. Fire intensities within the wetland areas are expected to be low to non-existent but some poolside vegetation may be consumed. This can alter the quantity and composition of emergent vegetation within wetlands, which provide cover for adult frogs, eggs, and tadpoles.

Slash piling and broadcast burning could have indirect effects to aquatic habitat by reducing surrounding ground cover and increasing sediment flow into stock tanks and drainages. Sedimentation and nutrient pulses or longer-term loading into lakes and ponds could occur as a result of project activities, affecting amphibian populations that are sensitive to such changes. This will only effect one growing season. Enhanced productivity of the herbaceous and shrub layers on the forest floor following treatments may create favorable microclimates for prey or cover (Semlitsch et al. 2009).

Project activities will likely benefit northern leopard frogs in fire-maintained ecosystems by restoring historical mosaics of successional stages, habitat structures, and vegetative species compositions. Breeding habitat for northern leopard frogs may be created in the form of small pools with the return of fire to forests due to a reduction in forest canopy cover and an extension of hydroperiods from reduced evapotranspiration (Pilliod et al. 2003). Any fire induced mortality will be outweighed by an increase in habitat heterogeneity and maintenance of preferred or required habitat resources (Pilliod et al. 2003).

Little Colorado Sucker

(*Catostomus* sp. 3)

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects

No direct effects to the Little Colorado sucker will occur since this species is not present in the Project Area.

Indirect sediment effects to suitable and potential habitats could occur but these effects should be minimal and primarily short-term. Habitats may be indirectly affected by elevated sediment delivery from increased surface erosion generated by ground disturbing activities such as road maintenance and reconstruction, mechanical harvesting activities, pile burning and broadcast burning throughout the Chevelon Creek Headwaters watersheds. The majority of any increased sediment deposition is expected to occur in the short term. Strict implementation of streamside management zone restrictions, designed to protect streams from excessive sediment generated on uplands and on roads, should prevent any significant deterioration of water quality (Watershed Specialist Report).

Since the species is dependent upon aquatic macroinvertebrates for a major portion of their diet, potential effects to this group are relevant to sucker habitats. Aquatic macroinvertebrates will be indirectly affected by project activities that result in increased sediment loading within their habitats. Increased sediment deposition will likely alter aquatic macroinvertebrate production, although not significantly. Changes to stream substrate and/or water quality parameters, related to increased sediment loading, will likely occur for Chevelon Creek over the short term, but BMPs have been designed to minimize these effects and will be applied during project implementation.

BMPs, including streamside management zone guidelines, will be implemented to retain the integrity of riparian habitats in the Woods Canyon, Willow Springs, and Chevelon Creek drainage as sediment buffer zones. The effectiveness of these buffer strips will be enhanced with the staging of timber treatments and prescribed burns in multiple year phases.

It is unlikely that changes in water quality from ash nutrient loading will occur with the implementation of prescribed burning. An increase in ash would likely occur after prescribed burning in the Project Area, but that the filtering capacity of the stream management zone buffers combined with the burn prescriptions, which limit the extent and severity of the burns, should keep the input of ash into stream channels to negligible levels.

Roundtail Chub

(*Gila robusta*)

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects

No direct effects to roundtail chub will occur with the implementation of the proposed action since the species is not present in the project area.

Short term and long term effects to habitat are the same as described for Little Colorado sucker. Habitats could be altered by short term increases in sediment loading into Chevelon Creek resulting in short-term impacts: higher substrate embeddedness and diminished invertebrate food source. Significant water quality declines are unlikely. Any short term increases in sediment levels will not impact species viability.

In the long term (5+ years after treatment), this project will be beneficial to roundtail chub with the reduction in fire hazard, as described for Little Colorado sucker.

A Stonefly [Mogollon Snowfly] (*Capnia caryi*), and all Caddis flies (*Lepidostoma apache*, *Lepidostoma knulli*, and *Limnephilus granti*)

Effects Analysis – Alternatives 2 and 3-Modified

Direct and Indirect Effects

Habitats could be altered by short term increases in sediment loading into Chevelon Creek resulting in higher substrate embeddedness. Significant water quality declines are unlikely due to strict implementation of streamside management zone restrictions, which are designed to protect streams from excessive sediment generated on uplands and on roads and should prevent any significant deterioration of water quality (Watershed Specialist Report). Any short term increases in sediment levels will not impact species viability. In the long term (5+ years after treatment), this project will be beneficial to Mogollon snowfly with the reduction in fire hazard.

Arizona Sneezeweed and Blumer's Dock

Alternatives 2 and 3-Modified

Direct and Indirect Effects

Streamside management zones, wetlands, and wet meadows would be protected from mechanical disturbances using best management practices, thereby reducing the chance of direct effects to Arizona sneezeweed and Blumer's dock and their habitat in these areas. If the plant is beyond the streamside buffer areas, they could be directly impacted by mechanical treatments.

There is no known documentation of fire effects to Arizona sneezeweed or Blumer's dock. Low severity broadcast fire may kill or damage plants. Pile burning would not occur in any ephemeral drainage. This would lessen the possibility of more severe fire impacts as ephemeral drainages are known to provide suitable habitat.

Meadow restoration treatment would open the canopy in some drainages and around meadows and cienegas. This could increase the habitat available. Maintenance treatments within meadows may also occur to reduce conifer encroachment.

Eastwood Alum Root and Arizona Alum Root

Alternative 2 and 3-Modified

Direct and Indirect Effects

Eastwood and Arizona alum-root could be directly impacted by mechanical treatment and low severity broadcast burning within ponderosa pine forests. Since Eastwood alum-root tends to grow on steeper slopes, most of the suitable habitat is located within streamside buffer or slopes >40%. Mechanical treatments are not expected to significantly affect Eastwood alum-root habitat. There are no known documentations of fire effects to Eastwood alum-root. Broadcast burning would occur on a broader scale than mechanical treatments and could have more of an effect on Eastwood alum-root plants and suitable habitat.

Maintenance and low severity broadcast burning would occur every two to ten years, so impacts associated with the initial broadcast burn treatments would reoccur. Benefits from maintenance treatments would include management towards VSS Class distribution objectives and increased understory herbaceous species.

Arizona Sunflower

(*Helianthus arizonensis*)

Alternative 2 and 3-Modified

Direct and Indirect Effects

Upland areas with dry, sandy soils are within locations that would receive both mechanical treatments and low severity broadcast fire. Individual Arizona sunflower plants that may exist in these areas could be damaged or removed by mechanical and broadcast fire treatments.

There is no known documentation of fire effects to Arizona sunflower. Broadcast or pile burning could kill or damage the plants. Maintenance low severity broadcast burning would occur every two to ten years, so impacts associated with the initial broadcast burn treatments would reoccur. Benefits from maintenance treatments would include management towards VSS Class distribution objectives and increased understory herbaceous species.

Bebb's Willow

(*Salix bebbiana*)

Alternative 2 and 3-Modified

Direct and Indirect Effects

Bebb's willows will not be harvested during thinning operations. Only hand thinning of encroaching conifers would occur within a minimum of 25 feet from all drainages, protecting this species from impacts. Direct mortality is not anticipated during project activities. Restoration treatments would open the canopy around some meadows, which could improve the vigor of existing plants.

Bebb's willows occupying dryer conditions that would succumb to burning are likely larger individuals that would be able to survive low intensity fire. Saplings occupying wetter areas would be safe from burning operations since fire would not carry well in moist conditions and fuels. Habitat conditions for Bebb's willow would improve within one growing season, especially if thinning occurred prior to burning. In addition, water tables will rise due to decreased evapotranspiration from competing overstory vegetation allowing for the establishment of Bebb's willow in areas they may have been excluded from before treatments. Prescribed fire is expected to create and improve existing Bebb's willow habitat. Levels of inorganic and nitrogen in soil are typically higher following fire (Covington and Sackett 1990) allowing for an increase in germination of surviving Bebb's willow seeds in the soil bank.

Arizona Phlox

(*Phlox amabilis*)

Alternative 2 and 3-Modified

Direct and Indirect Effects

Limestone outcrops on slopes within pine-oak habitats are likely outside of the areas that would receive treatments; therefore, mechanical treatments are not expected to affect Arizona phlox habitat. Individual Arizona phlox plants that exist outside these areas could be damaged or removed by mechanical treatments. There is no known documentation of fire effects to Arizona phlox. Broadcast burning would occur on a broader scale than mechanical treatments and could have more of an effect on Arizona phlox plants and suitable habitat. However, limestone outcrops may not have enough fuels to carry a broadcast fire and plants would therefore be protected.

Table 22. Summary of Determinations of Effect for Forest Service Sensitive Species.

SPECIES	DETERMINATION OF EFFECT		
	ALT 1	ALT 2	ALT 3-Modified
Pale Townsend's Big-eared Bat	NI	MII	MII
Spotted Bat	NI	MII	MII
Allen's lappet-browed bat	NI	MII	MII
Navajo Mogollon Vole	NI	MII	MII
Northern Goshawk	NI	MII	MII
American Peregrine Falcon	NI	MII	MII
Common Black Hawk	NI	MII	MII
Bald Eagle	NI	MII	MII
Northern Leopard Frog	NI	MII	MII
Little Colorado Sucker	NI	MII	MII
Roundtail Chub	NI	MII	MII
A Stonefly [Mogollon Snowfly]	NI	MII	MII
<i>Lepidostoma apache</i> - A Caddisfly	NI	MII	MII
<i>Lepidostoma knulli</i> - A Caddisfly	NI	MII	MII
<i>Limnephilus granti</i> - A Caddisfly	NI	MII	MII
Arizona Sneezeweed	NI	MII	MII
Eastwood Alum Root	NI	MII	MII
Arizona Alum Root	NI	MII	MII
Arizona sunflower	NI	MII	MII
Blumer's Dock	NI	MII	MII
<i>Bebb's Willow</i>	NI	MII	MII
Arizona Phlox	NI	MII	MII

NI = No Impact MII = May impact individuals, not likely to result in a loss of viability in the planning area nor cause a trend toward federal listing

Cumulative Effects for All Forest Service Sensitive Species

Past, present, and reasonably foreseeable future activities expected to cumulatively affect Forest Service sensitive species include timber sales and prescribed fire; ungulate grazing; burning in the Forest Lakes brush pit; recreational activities; community development; powerline maintenance; Highway 260 widening; Heber Allotment analysis; Heber Wild Horse Territory; and Forest Plan Revision.

Thinning and burning occurring near cave entrances may have disturbed bat roosts and forced bats to seek cave roosts elsewhere. Prescribed burning may result in loss of snag roost habitat. Additionally, bats that are disturbed during hibernation will likely die as a result of increased activity and their use of limited stored resources during the disturbance.

Long term benefits occur from all thinning and burning activities and include increased herbaceous vegetation with a subsequent increase in insect prey species.

Short-term impacts of all activities include removal of herbaceous cover and forage, and rarely, mortality of individual plants or animals.

Management Indicator Species (MIS) and Ecological Indicators (EIs)

The Forest Service Manual (FSM) defines management indicators as: “Plant and animal species, communities or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent.” (FSM 2620.5).

The Forest Plan developed a MIS list for each of the Management Areas designated for compliance with NFMA regulations. In 2012, the ASNF updated the Forest level MIS analysis with detailed habitat and life history characteristics for each MIS species. The ASNF LRMP lists sixteen wildlife species and one wildlife category (aquatic macro-invertebrates) as MIS for the Forests. MIS species occurring within MA-1 are the only species considered in the effects analysis with two exceptions: 1) aquatic macroinvertebrates and 2) Pronghorn antelope, identified as indicators for MA-2 (woodland). Table 6 summarizes the species, their habitat within the project area, and population trends for the MIS analyzed for this project. The ASNF is currently in the process of developing a new Forest Plan, slated to be released in 2015. The updated Forest Plan proposes three MIS species and two habitat Ecological Indicators (EIs). Updated MIS overlap with existing MIS, and are as follows: Mexican spotted owl, northern goshawk, and pronghorn antelope. EIs are newly developed and are based upon the ASNF Potential Natural Vegetation Types (PNVT) GIS layer, which has been developed through the utilization of the Terrestrial Ecosystems Survey of the ASNF, also known as the soils layer. Proposed EIs include Aspen and Riparian (Table 23). Riparian only occurs within the Larson Project Area in Larson Canyon; however, though no large stands of aspen exist within the Project Area, aspen exist in small pockets and will therefore also be considered. For the purposes of this project, the proposed MIS as well as the EIs will also be included for analysis.

Effects Analysis for MIS and EIs

Alternative 1

Direct and Indirect Effects for all Management Indicator Species and EIs: Alternative 1 would not result in an immediate change to the quantity or quality of habitat used by any of the management indicator species. Forested habitat (29,507 acres) would continue to be overstocked and shade out understory. Meadow and grassland habitats would continue to receive conifer encroachment over time. The Forested Habitat within the Project Area would remain within the FRCC 3 level and be at a higher risk of stand replacing crown wildfire (Fire Specialist Report). Roads would not be decommissioned or rehabilitated thus continuing to negatively affect water quality and watershed function.

Alternatives 2 and 3-Modified

Direct and indirect effects of the alternatives are summarized in Table 24.

Cumulative Effects for Management Indicator Species and EIs.

Past, present, and reasonably foreseeable future activities expected to cumulatively affect management indicator species and ecological indicators include past, present and future timber sales and prescribed fire; ungulate grazing; community development; Forest Lakes Brush Pit; recreational activities; Travel Management Rule; Forest Plan Revision; Heber Wild Horse Territory; powerline maintenance; and Highway 260 Widening.

Thinning and burning are known to regenerate aspen. Past projects such as timber harvest and prescribed burning have likely increased the amount of habitat available for MIS. All of these projects allow for the increase in growth of understory vegetation such as grasses, forbs, and shrubs, which consequently provided foraging habitat for MIS. These activities open up the canopy, which is beneficial for some MIS. In addition, areas that have not undergone treatments in the past provide excellent hiding and thermal cover adjacent to these higher quality forage areas. All of these projects allow for the increase in growth and vigor of trees, which consequently provided foraging and nesting habitat for MIS.

Table 23. MIS Species, Habitat Components, Forest Trends, and Acres Analyzed.

Species	Habitat Component Indicated	Forest-wide Habitat Trend	Forest-wide Population Trend	Acres to be Analyzed in Project Area
MA-01 Forested Land				
Hairy Woodpecker (<i>Picoides villosus</i>)	Snags (all types)	Upward	Stable	29,494
Red-naped sapsucker (<i>Sphyrapicus nuchalis</i>)	Snags (Aspen)	Stable	Stable	63
Northern Goshawk (<i>Accipiter gentilis</i>)	Late Succession	Stable to Downward	Downward	26,664
Merriam's Turkey (<i>Meleagris gallopavo</i>)	Late Succession	Stable	Stable	29,494
Pygmy Nuthatch (<i>Sitta pygmaea</i>)	Late Succession	Downward	Stable	27,306
Mexican Spotted Owl (<i>Strix occidentalis lucida</i>)	Late Succession	Downward	Downward	2,850
Elk (<i>Cervus elaphus</i>)	Early Succession	Upward	Stable to Downward	29,913
Mule Deer (<i>Odocoileus hemionus</i>)	Early Succession	Upward	Stable to Upward	29,913
Abert's Squirrel (<i>Sciurus aberti</i>)	Early Succession (ponderosa pine)	Stable to Downward	Stable	27,306
Red Squirrel (<i>Tamiasciurus hudsonicus</i>)	Late Succession (spruce/mixed conifer)	Upward	Stable	1,676
Aquatic Macroinvertebrates	Riparian	Downward	Stable to Downward	18*
Pronghorn Antelope (<i>Antilocapra americana</i>)	Woodland	Upward	Stable	25,000

* Acreage includes all tanks and wetland areas. Amount of riparian habitat at each location is unknown but is assumed present.

Table 24. Summary of Effects of Alternatives 2 and 3 and Consistency with the Forest Plan for MIS.

SPECIES	SUMMARY OF EFFECTS	CONSISTENCY WITH FOREST PLAN
Hairy Woodpecker <i>(Picoides villosus)</i>	Habitat quality would increase due to increased tree growth rates and vigor resulting in higher VSS Class values over time. Increase in snag decay and insect activity immediately following the activity favors cavity nesting and foraging species. Prescribed burns maintain desired forest structure, tree densities, snag densities and coarse woody debris levels. Prescribed burning is likely to create new foraging and nesting habitat. Short-term disturbance would temporarily displace and alter foraging and nesting habitat. Timing restrictions for treatment activities within MSO PAC's and Northern Goshawk PFA's would not disturb hairy woodpeckers during the breeding season.	No reduction in habitat suitability or a loss of viability for hairy woodpeckers Forest-wide. Would achieve Forest Plan objectives for habitat and population trends. Would result in improved habitat quality (forest structure). Would contribute to Forest-wide habitat and population trends.
Red-naped sapsucker <i>(Sphyrapicus nuchalis)</i>	Thinning and burning treatments, and fencing aspen stands would result in aspen regeneration which would benefit this species. Red-naped sapsucker abundances are expected to decrease following prescribed fire due to the fact that many live mature or decadent trees would become snags and succession would revert to a younger aged forest (Dieni and Anderson 1999). Long-term, prescribed burning is expected to improve habitat quality and quantity as prescribed fire is used to maintain and stimulate future aspen trees.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for red-naped sapsuckers Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for red-naped sapsuckers. The proposed action would result in a small increase in habitat quantity and quality for red-naped sapsuckers. The total increases in quantity and quality are expected to contribute to Forest-wide habitat and population trends.

SPECIES	SUMMARY OF EFFECTS	CONSISTENCY WITH FOREST PLAN
Northern Goshawk <i>(Accipiter gentilis)</i>	Habitat quality would increase due to increased tree growth rates and vigor resulting in higher VSS Class values over time. Increase in snag decay and insect activity immediately following the activity favors cavity nesting and foraging species, important prey species for northern goshawks. Thinning and prescribed fire treatments maintain desired forest structure, tree densities, snag densities and coarse woody debris levels. Thinning and prescribed fire treatments are likely to create new foraging and nesting habitat.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for northern goshawks Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for northern goshawks. The proposed action would result in a small increase in habitat quantity and quality for northern goshawks. This increase in habitat is not expected to contribute to Forest-wide habitat and population trends.
Merriam's Turkey <i>(Meleagris gallopavo)</i>	Timber harvest and thinning alter turkey nesting habitat by reducing habitat components for nesting success (basal area, overhead canopy cover, and horizontal screening cover). However, thinning and prescribed burning treatments would remove encroaching conifer trees from meadows, create openings in forested stands, and stimulate grass and forb growth, which would increase the abundance of insects and vegetation resulting in improved foraging habitat. Implementation of uneven-aged management would retain tree clumps of various age and size classes which would provide cover and roosting habitat. Following treatments, understory vegetation will provide horizontal cover and possibly increased nest success. Broadcast burning and smoke effects may disturb individual birds but this should be short-term impact. Thinning and prescribed burning will adhere to MSO and goshawk timing restrictions in and near those habitats, so turkeys would not be impacted during the nesting season in those areas.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for Merriam's turkeys Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for Merriam's turkeys. The proposed action would result in a small increase in habitat quantity and quality for Merriam's turkeys. This increase in habitat is expected to contribute to Forest-wide habitat and population trends.

SPECIES	SUMMARY OF EFFECTS	CONSISTENCY WITH FOREST PLAN
Pygmy Nuthatch (<i>Sitta pygmaea</i>)	Quality habitat would increase due to thinning small and medium sized trees and retaining most large trees. Thinning of trees will promote an herbaceous understory, which will improve insect prey habitat. Prescribed burning is likely to create new nesting habitat while consuming some existing snags, as burning often causes scattered or small groups of tree mortality. Burning related tree mortality can cause short-term increases in bark beetle densities, which may enhance foraging opportunities. Prescribed burns are designed to maintain desired forest structure, tree densities, snag densities and coarse woody debris levels. Short-term disturbance by treatment activities would temporarily displace and alter foraging and nesting habitat. Timing restrictions for treatment activities within MSO PAC's and Northern Goshawk PFA's would reduce disturbance in those areas during the breeding season. Thinning, combined with prescribed burning, is expected to increase densities of pygmy nuthatches within the project area, especially if large trees and snags are retained.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for pygmy nuthatches Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for pygmy nuthatches. The proposed action would result in a small increase in habitat quantity and quality for pygmy nuthatches. This increase in habitat is expected to contribute to Forest-wide habitat and population trends.
Mexican Spotted Owl (<i>Strix occidentalis lucida</i>)		The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for MSOs Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for MSOs. The proposed action would result in a small increase in habitat quantity and quality for Mexican spotted owls. This increase in habitat is not expected to contribute to Forest-wide habitat and population trends.

SPECIES	SUMMARY OF EFFECTS	CONSISTENCY WITH FOREST PLAN
Elk <i>(Cervus elaphus)</i>	Thinning forest stands followed by low severity broadcast burning would result in more foraging habitat (70%) than cover habitat (30%). Hiding cover would be retained along at least 40% of arterial and collector roads. It is expected that hiding cover would be better dispersed due to the uneven stand VSS Classes and the retention of clumps and small to medium-sized trees. Because of this uneven structure, wildlife hiding and thermal cover within treated stands would likely be more effective. Thinning and prescribed fire can be used to rejuvenate aspen and browse stands, encourage early spring green-up of grasslands, slow or prevent conifer encroachment in important foraging areas, increase palatability in foods, reduce the height of browse species, and stimulate regeneration of browse species through sprouting or heat scarification of seed. Short-term disturbance to elk and mule deer by treatment activities would temporarily displace and alter foraging, resting, and traditionally used areas. Timing restrictions for treatment activities within MSO PAC's and Northern Goshawk PFA's would minimize disturbance during calving and fawning seasons in those areas.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for elk or mule deer Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for elk and mule deer. The proposed action would result in a small increase in habitat quantity and quality for elk and mule deer. This increase in habitat is expected to contribute to Forest-wide habitat trends for elk and mule deer. It is not expected to contribute to Forest-wide elk population trends but is expected to contribute to Forest-wide mule deer population trends.
Mule Deer <i>(Odocoileus hemionus)</i>	Same as described for elk.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for elk or mule deer Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for elk and mule deer. The proposed action would result in a small increase in habitat quantity and quality for elk and mule deer. This increase in habitat is expected to contribute to Forest-wide habitat trends for elk and mule deer. It is not expected to contribute to Forest-wide elk population trends but is expected to contribute to Forest-wide mule deer population trends.

SPECIES	SUMMARY OF EFFECTS	CONSISTENCY WITH FOREST PLAN
Abert's Squirrel <i>(Sciurus aberti)</i>	Stand treatments would be developed according to Forest Plan guidelines for northern goshawk and would therefore benefit Abert's squirrel habitat. Large tree retention and a groupy/clumpy distribution will favor Abert's squirrels. Thinning of understory, sapling-sized trees would benefit squirrels through an increase in the hypogeous fungi on which they feed; an improvement in forest health and tree growing conditions, and the reduced risk of wildfire. Prescribed fire can thin out areas with dense thickets of ponderosa pine. This results in improved health of taller individual trees due to reduced competition for resources and decreased potential for insect outbreaks from stressed trees. These healthier trees will provide higher quality forage and reduce home range size for Abert's squirrels.	The actions proposed in the Action Alternative are not expected to result in a reduction in habitat suitability or a loss in viability for Abert's squirrels Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for Abert's squirrels. The proposed action would result in a small increase in habitat quantity and quality for Abert's squirrels. This increase in habitat is expected to contribute to Forest-wide population trends but is not expected to contribute to Forest-wide habitat trends.
Red Squirrel <i>(Tamiasciurus hudsonicus)</i>	Short term effects from proposed treatments would include reducing habitat quality by reducing canopy closure, but long term would reduce the potential for stand replacing, high severity, crown fires that negative effect red squirrels. Managing for old growth and MSO Forest Plan guidelines would provide higher basal area, larger trees, and interlocked canopies that benefit red squirrel. Broadcast burning may consume downed logs and snags used by squirrels for nesting habitat and pine cone cache sites, but low-severity prescribed fire normally affects younger stages of trees. Therefore it is unlikely to affect red squirrels, since important habitat includes mature trees that are not likely to be adversely affected by low-severity fires. Some squirrel mortality could occur if food caches are burned. Forest treatments that restore healthier forests contribute to greater resource availability, which would allow red squirrels to travel less for resources and result in the forests ability to accommodate larger populations of red squirrels.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for red squirrels Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for red squirrels. The proposed action would result in a small increase in habitat quantity and quality for red squirrels. This increase in habitat is expected to contribute to Forest-wide habitat and population trends.

SPECIES	SUMMARY OF EFFECTS	CONSISTENCY WITH FOREST PLAN
Aquatic Macroinvertebrates	All tanks, wetlands, and streams will have a designated buffer during project implementation, which will prevent any direct affects associated with activities. Indirect sediment effects to suitable and potential habitats could occur but these effects should be minimal and primarily short-term. Habitats may be indirectly affected short term by elevated sediment delivery from increased surface erosion generated by ground disturbing activities, which may add to existing substrate embeddedness and increase stream temperatures. Riparian condition which includes stream-bank soil and vegetative stability should not be affected with implementation of the proposed action. BMPs, including streamside management zone guidelines, will be implemented to retain the integrity of riparian habitats in the Woods Canyon, Willow Springs, and Chevelon Creek drainage as sediment buffer zones. It is unlikely that changes in water quality from ash nutrient loading will occur with the implementation of prescribed burning. An increase in ash would likely occur after prescribed burning in the Project Area, but that the filtering capacity of the stream management zone buffers combined with the burn prescriptions should keep the input of ash into stream channels to negligible levels. Benefits from maintenance treatments would include management towards VSS Class distribution objectives and increased understory herbaceous vegetation that would benefit aquatic macroinvertebrates through increased bank stability and a reduced potential for increased sediment inputs.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for aquatic macroinvertebrates Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for aquatic macroinvertebrates. The proposed action would result in a small increase in habitat quantity and quality for aquatic macroinvertebrates. This increase in habitat is not expected to contribute to current Forest-wide habitat and population trends.

SPECIES	SUMMARY OF EFFECTS	CONSISTENCY WITH FOREST PLAN
Pronghorn Antelope (<i>Antilocapra americana</i>)	The opening of canopy within historic grassland habitat will allow for the growth of herbaceous cover and forbs, providing pronghorn with suitable foraging habitat. Thinning alone or combined with prescribed fire will likely increase forage quantity and quality for pronghorn antelope. Benefits of fire to ungulates are related to increases in understory vegetation resulting in reductions in the number of live, competing trees, amount of litter, and depth of duff. However, fire can be detrimental to antelope habitat when it removes habitat features associated with forage, bedding cover, and thermal protection.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for pronghorn antelope Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for pronghorn antelope The proposed action would result in a small increase in habitat quantity and quality for pronghorn antelope. This increase in habitat is expected to contribute to Forest-wide habitat and population trends.

Table 25: Habitat Ecological Indicators within the Larson Project Area, Trends, and Acres.

ECOLOGICAL INDICATOR	HABITAT DESCRIPTION	COMMUNITY TREND	PNVT ACRES WITHIN PROJECT AREA
Aspen <i>Populus tremuloides</i>	No pure aspen stands exist within the Larson Project Area; however, aspen do exist in small openings and exclosures. Ten exclosures currently occur within the Larson Project Area that aid in the protection of aspen. Where aspen exist outside of exclosures, stands consist mainly of older trees and recruitment is low to nonexistent due to the effects of conifer encroachment and heavy ungulate browsing.	Upward*	63
Riparian Cottonwood-Willow Riparian	Riparian habitat within the Larson Project area has been identified as Cottonwood-Willow Riparian Forest (CWRF). Though 176 acres of habitat has been identified as Riparian within the PNVT layer, 21 miles of drainages surveyed for Proper Functioning Condition (PFC) were identified as riparian. Of the 21 miles of identified riparian drainages, 16 acres were identified as PFC. Four miles of drainages were identified as Functional At Risk (FAR), while one and a half miles were considered Not Functional (NF). Two joined exclosures occur within the Larson Project area that aid in the protection of this riparian habitat. These exclosures protect only eight acres of this sensitive habitat type.	Downward	176

*Prior to the 2011 Wallow Fire, aspen were in a static to downward trend due to the effects of conifer encroachment and browsing. Aspen now sprout prolifically within the Fire area and an upward trend has been inferred.

Table 26. Summary of Effects of Alternatives 2 and 3-Modified and Consistency with the Forest Plan for EIs.

SPECIES	SUMMARY OF EFFECTS	CONSISTENCY WITH FOREST PLAN
Aspen <i>Populus tremuloides</i>	Thinning and burning treatments are expected to stimulate aspen regeneration. Prescribed burning will occur after mechanical treatments. These areas would experience a patchy, low-severity burn that would likely have little to no effect on competing overstory pine trees. Aspen restoration treatments would include mechanical removal of encroaching pine trees, scarification of soils to stimulate aspen suckering, and prescribed burning to improve the health and resiliency of aspen clones, move stands towards multiple canopy layers, and provide for a more robust understory response. Fencing or other barriers would be constructed after treatments to facilitate regeneration of aspen and to prevent ungulate grazing within aspen clones. Short term decreases in aspen abundance is expected following treatments due to the fact that some aspen may be directly killed during implementation. Long term, treatments are expected to increase aspen habitat quantity and quality.	The actions proposed in Alternatives 2 and 3 are not expected to result in a reduction in habitat suitability or a loss of viability for aspen Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for aspen. The actions proposed in Alternatives 2 and 3 would result in a small increase in habitat quantity and quality for aspen. The total increases in quantity and quality is not expected to contribute to Forest-wide habitat and population trends.
Riparian Cottonwood- Willow Riparian	Treatments to remove all post settlement ponderosa pine where they have encroached into riparian areas would benefit riparian vegetation by increasing stream flows, reducing shading, reducing litter accumulations, increasing habitat heterogeneity long term, and reducing the threat of stand replacing high severity fire. Treatments would be designed to minimize disturbance, but some short term disturbance to vegetation is expected. Prescribed fire is expected to improve existing riparian habitat. Riparian planting would improve groundcover and bank stability.	The actions proposed in the action alternative are not expected to result in a reduction in habitat suitability or a loss of viability for riparian habitat Forest-wide. This alternative is expected to achieve Forest Plan objectives for habitat and population trends for aspen. The proposed actions would result in a small increase in riparian habitat quantity and quality. The total increases in quantity and quality is not expected to contribute to Forest-wide habitat trends.

Migratory Birds

President Clinton signed Executive Order 13186 on January 10, 2001, placing emphasis on conservation of migratory birds. This order requires that an analysis be made of the effects of Forest Service actions on species of concern and important bird areas (IBAs) as listed and identified by Partners in Flight (Latta, et al. 1999), and the effects to important overwintering areas.

Considered for these analyses were (1) birds identified as priority species in the Arizona Partners in Flight Bird Conservation Plan (Latta, et al. 1999) (APIF Plan) and (2) birds in Bird Conservation Regions 34 and 16 of U.S. Fish and Wildlife Service's 2008 Birds of Conservation Concern (BCC) (USDI 2008). Important Bird Areas (IBAs) are also addressed.

A total of 46 species have been identified as species of concern on ASNF habitats. Six of these, including common black hawk, Mexican spotted owl, northern goshawk, bald eagle, peregrine falcon, and red-naped sapsucker, are discussed in the Threatened, Endangered, Sensitive Species and MIS sections of this report and will not be discussed further here.

Take Statement

No significant effects will occur to range-wide populations of migratory bird species dependent on mixed conifer, ponderosa pine, and pine-oak woodland. There would be no change in the habitat suitability for migratory birds. No intentional take would result from actions proposed in this project. Unintentional take of individual migratory birds may occur, but will not result in changes to the range-wide populations of these species.

Important Bird Areas

Important Bird Areas (IBAs) are listed on the Audubon Society's website. There are no identified or potential IBAs within the Project Area. The Snowmelt Draw IBA occurs almost six miles west of the Project Area. Therefore, no IBAs would be affected by the project.

Table 27. Effects Analysis for Migratory birds in the Larson project area.

VEGETATION TYPE	SPECIES	HABITAT	LARSON HABITAT IMPACTS	DISTURBANCE EFFECTS TO SPECIES
Mixed Conifer	Olive-sided Flycatcher	Forest openings and edges with mature pines and snags.	Project activities will increase understory vegetation and promote growth of remaining trees.	Short-term disturbance possible during project activities. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.
Ponderosa Pine	Purple Martin	Large snags in or near open areas.	Project activities will reduce snags. Some new snag recruitment will occur.	Short-term disturbance possible during project activities. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.
	Flammulated Owl	Old growth forests with some undergrowth or intermixture of oaks.	Project activities will increase understory vegetation and promote growth of remaining trees.	Short-term disturbance possible during project activities. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.
	Lewis' Woodpecker	Typically found in logged or burned areas with brushy	Project activities will increase understory vegetation and	Short-term disturbance possible during project activities. Long-term, activities will aid in

VEGETATION TYPE	SPECIES	HABITAT	LARSON HABITAT IMPACTS	DISTURBANCE EFFECTS TO SPECIES
		understories and snags. Strongly associated with fire-maintained old-growth.	promote growth of remaining trees.	maintaining preferred habitat components. No adverse effects expected.
	Grace's Warbler	Montane pine forests.	Project activities will increase understory vegetation and promote growth of remaining trees.	Short-term disturbance possible during project activities. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.
	Cassin's Finch	Mature, open coniferous forests of interior western mountains.	Project activities will increase understory vegetation and promote growth of remaining trees.	Short-term disturbance possible during project activities. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.
	Olive Warbler	Open coniferous forests, including those with a Gambol oak component.	Project activities will increase understory vegetation and promote growth of remaining trees.	Short-term disturbance possible during project activities. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.
Madrean Pine-Oak Woodland	Band-tailed Pigeon	Temperate and montane coniferous and mixed forests and woodlands.	Project activities will increase understory vegetation and promote growth of remaining trees.	Short-term disturbance possible during project activities. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.
	Canyon Towhee	Dense brush, arid scrub, and riparian thickets in rocky areas.	Project activities will increase understory vegetation and promote growth of remaining trees. Shrubs will reestablish after project activities.	Short-term disturbance possible during project activities. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.
	Montezuma Quail	Pine-oak and oak scrub in highlands especially in open woodlands with grassy understories.	Project activities will increase understory vegetation and increase herbaceous cover.	Short-term disturbance possible during project activities. Short term loss in herbaceous understory. Long-term, activities will aid in maintaining preferred habitat components. No adverse effects expected.

Heritage Resources

The Southwest Region has established a programmatic agreement with the Advisory Council on Historic Preservation (ACHP) and State Historic Preservation Officers (SHPOs) that stipulates the Forest Service's responsibilities for complying with the National Historic Preservation Act (NHPA). The Southwestern Region has developed a standard consultation protocol for large scale hazardous fuels reduction, vegetation treatment, and habitat improvement projects: appendix J of the programmatic agreement. By following the procedures of the protocol, the ACHP and SHPOs have agreed that the Forest Service would satisfy legal requirements for the identification, evaluation, and treatment of historic properties. The ASNFs is complying with the protocol in lieu of standard consultation in the programmatic agreement and the council's regulations (36 CFR 800). In

consultation with the SHPO, the terms of the protocol allow for the appropriate level of cultural resource surveys to be completed after the NEPA decision, but prior to implementation of the project activities.

During previous inventory, 13 sites had been recorded within the Larson project boundary. One site is the historic General Crook's Trail, which is marked with blazed trees. Eight sites are prehistoric lithic scatters. Some of these are comprised of flakes only, some have flakes and cores or other tools, and some sites are quarries where raw material was tested and procured. One of these sites contains diagnostic ceramics which reveal a site age of AD 950. Also within the Larson project boundary, there is a rock shelter with pictographs. Lastly, there is a habitation site with associated artifacts that represent two separate occupations in time: AD 200-600 and AD 1100-1300. There are at least two sites within the Larson project boundary for which there is no information, and these may be isolated occurrences rather than sites. More information is needed to determine this.

Traditional Cultural Properties

Western Apache and Yavapai groups are known to have traditional ties to lands within the Larson project area. The following tribes were consulted regarding the proposed action: White Mountain Apache Tribe, San Carlos Apache Tribe, Tonto Apache Tribe, Yavapai-Apache Nation, Yavapai-Prescott Tribe, Ft. McDowell Yavapai Indian Nation, Hopi Tribe, Navajo Nation, and Pueblo of Zuni. At present, no Tribe has expressed concerns or identified that a TCP would be affected by project activities.

Environmental Consequences

All Larson Restoration Project proposed treatments would be managed as having either "no effect" or "no adverse effect" to cultural resources. Under the regulations, an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a cultural resource that qualify the property for inclusion in the National Register. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register.

Most of the lands within the forests are located in a fire-adapted ecosystem. Generally, low intensity fires have not adversely impacted prehistoric sites that are not fire sensitive or composed of combustible material. Conversely, most historic sites are either combustible or include combustible cultural material. Adverse impacts from fire may include but are not limited to historic sites completely burned down, prehistoric rock structures spalling apart from exposure to very high temperatures, the re-firing of ceramic material, melting obsidian artifacts (caused by high-intensity and long duration fires), killed trees falling and uprooting the ground surface displacing or damaging cultural features and structures, creation of burned stump holes that result in erosion, and denuding of the ground surface exposing cultural materials to increased erosion and visibility that increases the potential for theft.

Alternative 1 – No Action

Failure to reduce accumulated fuel loads may increase the effects from high intensity and high severity wildfires, thereby increasing the potential for adverse effects to prehistoric and historic structures and artifacts. The "no action" alternative would result in no direct effects to cultural resources, but may increase the potential of indirect effects from high intensity, high severity wildfires. This alternative would not affect traditional cultural properties.

Alternatives 2 and 3-Modified

Removal of trees would reduce long term fuel continuity, fuel loading, and fire hazard which would benefit cultural resources within the project area by decreasing the potential for adverse effects caused from high intensity, high severity wildfires. Alternative 3's diameter limit would have no direct bearing on the impacts to cultural resources. Because alternative 3 reduces the fire hazard less effectively for a shorter duration, alternative 2 has more benefits to cultural resources.

No impacts to cultural resources are anticipated from road maintenance and temporary road construction activities because of project design. All proposed haul roads and temporary road locations would be covered by survey and cultural resources identified for avoidance, or mitigation measures would be used to minimize the impacts to the sites to result in no adverse effects. Based on previous survey data and the stipulations of appendix J of the programmatic agreement and the protection measures outlined in section II of appendix J are met, no adverse impacts to cultural resources are anticipated from mechanized treatment and burning.

Neither alternatives 2 nor 3 would result in unavoidable, irreversible, or irretrievable impacts to cultural resources in the project area. Neither alternative would affect traditional cultural properties.

Cumulative Effects

During the 1980s through the early 1990s, records indicate that approximately 5,528 acres of the project area were mechanically harvested for timber. Although records indicate that some of the timber sale roads created for access and transportation were surveyed for cultural resources prior to construction, others were never surveyed and unrecorded sites could have been impacted. The project area has also been grazed by cattle and sheep. Sites within the grazing allotment may have been impacted by past intensive grazing activities that were allowed during the 1900s. Most of the lands within the project area are located in a fire-adapted ecosystem. Evidence that prehistoric sites on the forest have been repeatedly burned (prior to active fire suppression) is demonstrated by fire scarred trees and thermally (fire) altered artifacts. Many of the areas that were harvested for timber have been treated with prescribed fire.

Existing records indicate that past management activities have not caused adverse effects to known cultural resources within the project area, except for the General Crook Trail. Documents indicate that some historic blazed trees and features associated with the General Crook Trail may have been altered or destroyed due to lack of identification during past project planning and implementation, public awareness, and intentional vandalism.

Four projects within the Apache-Sitgreaves National Forests' boundary have adjacent or in close proximity to the Larson Restoration Project area. The Rim Lakes Project, the Nagel Forest Health Project area, the Little Springs and Forest Lakes Project areas. Private landowners have made efforts and would foreseeably continue to make effort in the area to treat for fuels reduction and restoration. These projects are not expected to have an adverse effect to cultural resources.

Existing records indicate that previous management activities have generally resulted in no adverse impacts to cultural resources within the project area. Presently, prior to any actions or ground-disturbing activities that have the potential to affect the character or use of cultural resources, the ASNFs ensures compliance with the NHPA by following the stipulations of the programmatic agreement. If cultural resources are located within the project area, avoidance or appropriate mitigation measures will be implemented to achieve a determination of no effect or no adverse effect to cultural resources.

The expected cumulative effects on cultural resources in the project area from alternative 1 would be that the archaeological sites would continue to exist in their current condition. Alternatives 2 and 3-Modified are not expected to have direct cumulative impacts to cultural resources since no direct or indirect effects are expected. Cultural resources would be avoided or protected as appropriate from project activities so the action would not have an adverse effect.

Recreation, Scenery, Lands, Special Uses, and Special Areas

Existing Condition

The White Mountains and the Mogollon Rim are destinations for outdoor recreation and climatic relief from summer temperatures in the Phoenix and Tucson metropolitan areas. Popular recreational activities include hiking, mountain biking, Off-Highway Vehicle (OHV) use, fishing, picnicking, camping, horseback riding, big game hunting, firewood gathering, wildlife and scenery viewing, and driving for pleasure.

Special uses in the analysis area center on public utilities. Arizona Public Service (APS) and Salt River Project (SRP) have power lines crossing the project, providing service to the Phoenix area and locally to the Forest Lakes community and a private in-holder in the project boundary. There is one access to a developed parcel of private land surrounded by National Forest.

Recreation

Motorized Trails

There are no properly designated motorized trail systems in the project area that are off of system roads. However, the Black Mesa Ranger District has recognized 4.2 miles of the Larson Canyon Trail #238 and the 99A OHV Trail #299A within the project area, as both trails do join strictly OHV designated trails south of the project boundary. The Larson Canyon Trail #238 and 99A OHV trail #299A that are designated in the Forest Service trails database are also managed as Level 2 roads.

Non-Motorized Trails

There are 11.6 miles of non-motorized Forest System trails in the analysis area, including Trail #535 Willow Springs Bike Loop, Trail #502 235 Road Trail, and Trail #140 General Crook National Recreation Trail, all of which are both designated as Hike/Bike/Horse trails. The Willow Springs Bike Loop route follows NFSR236, NFSR236A, and NFSR9505, which are all maintenance level 1 roads. All of the non-motorized trails in the project area (aside from the General Crook Trail) follow Level 1 roads. The Willow Springs Bike Loop and the General Crook Trail are accessed at the Larson Ridge Trailhead off of NFSR237. The trailhead consists of a parking lot, kiosk, and vault toilet. The trail entrance is over a locked gate on NFSR236.

Lands and Special Uses

The Ryan Ranch subdivision, also known as Homestead Entry Survey (H.E.S.) 191, is a 48 acre parcel of private land within the Larson project area, surrounded on all sides by national forest system lands.

Two wing fences were constructed in 2011 to discourage OHV use in the Forest Lakes OHV closure area. The wing fences were constructed on the west side of the Ryan Ranch private land in-holding at

both the north and south ends. Each wing fence extends from the private land boundary west, 200-350 feet.

Two mining claims exist along Larson Canyon north of the Forest Lake community, T11N, R14E section 3, and T12N, R14E, section 34. Arizona Picture Rock (AZPR) and Independence Picture Rock (IPR) claims are owned by the same individual. Recent reclamation work was started in the area.

Special Uses

Land uses permitted under special uses authorizations within or immediately adjacent to the project area include a 500 kilovolt (kV) transmission line and a 345 kV transmission line in the same utility corridor. The kV power transmission lines are critical utility corridors within the western United States power grid, primarily feeding the Phoenix metropolitan area. There is also a 21 kV distribution line that services the community of Forest Lakes. The following table describes the number of acres encompassed by the Special Use permits to utility companies.

Table 28 – Utility Corridors in Larson Project Area

Utility Line Type	Miles in Project Area	Width of Corridor	Acres in Project Area
550 kV	8	200	197
345 kV	8	315	310
21 kV	2	20	6
Total	19 miles		514 acres

Environmental Consequences to Recreation, Lands, and Special Uses

Alternative 1 (No Action)

Existing recreation opportunities would continue to be available. Forest visitation would also continue under this alternative. Motorized vehicle use would be maintained according to the existing restrictions described in the Rim Lakes Management and Willow Springs/Horse Trap Forest Orders. Motorized vehicle use would be maintained. There would be no change in the authorization or administration of the utility corridor. Status of authorized access to private land within and adjacent to the Larson project area would not change.

Over time, fuels would accumulate in the project area and subject the existing recreation facilities, trails, private land, and utility corridors to a higher probability of damage due to severe wildland fires. These fires reduce or essentially eliminate the quality of recreational settings and experiences that are desirable in the Larson project area. Loss of recreation facilities and infrastructure would result in closed or limited facilities, displacement of forest visitors and loss of revenue to local business owners.

Impacts under Alternatives 2 and 3-Modified

Effects to designated developed and dispersed recreation are similar. Forest Road 237 CUA and Larson Ridge Trailhead would be directly impacted during mechanical treatments and prescribed fire. The trailhead parking area consists of no more than two acres. Recreation users may be temporarily displaced by mechanical treatments and prescribed fire operations. Other dispersed camping areas may also be intermittently closed during restoration treatment operations. Recreation opportunities would be available but impacted by logging traffic associated with salvage tree removal.

Dust from logging traffic would cause reduced visibility along forest roads during the months of little to no precipitation. Motorized and non-motorized trails would benefit from the removal of hazard trees that could impede the trail and/or cause a hazard to trail user. Temporary displacement of trail users would occur during restoration activities.

Cumulative Effects

Past and Present Actions

Activities that created the current recreation conditions include improvements and maintenance to the recreation facilities to meet the needs of the forest visitor and provide for public health and safety, resource protection, and the maintenance of utility corridors. Approximately 200 acres within the utility corridor were cleared of vegetation in 2013. Reclamation of three picture sandstone rock quarries from Arizona Picture Rock (AZPR) and Independence Picture Rock (IPR) claims was completed in 2012. Reclamation activities included planned decommissioning of NFSR237C and the southern length of NFSR172D from the intersection with NFSR172 to the quarry.

Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions include vegetation removal within the APS/SRP utility corridors which will occur on a regular 5- to 10-year schedule. This effect will be limited to the permitted easement. Changes to the Ryan Ranch subdivision will include issuance of an easement, potential improvements to the permitted road, and installation of a gate at the intersection of NFSR99A and NFSR99M. Further development or change in ownership of the private land subdivision surrounded by the Larson project boundary is not within the control of the Forest Service; however no changes are currently planned. Currently the forest is in the process of analyzing changes to travel management in conformance with the Travel Management Rule, including prohibiting motor vehicle use off the designated National Forest Road System.

Scenery

Visual Quality Objective (VQO) categories as part of the Visual Management System have been replaced with Scenic Integrity Objectives (SIO) as part of the Scenic Management System.

Table 29 – Visual Quality Objectives across Larson Project Area

VQO from VMS	SIO from SMS	Acres in Project Area	Percent of Project Area
Partial Retention (PR)	Moderate (M)	16,037	53%
Modification (M)	Low (L)	8,677	29%
Retention (R)	High (H)	5,326	18%
Total		30,040	

Alternative 1 (No Action)

Unless the project area becomes impacted by severe wildland fire, scenery impacts will remain unchanged except for the view of continued vegetation growth and visual impacts from uses left unmanaged.

Alternatives 2 and 3-Modified

Improvement to the viewshed would be realized to reach its maximum natural scenic potential that existed historically. With implementation of the proposed actions it is anticipated there would be an overall beneficial effect by enhancing the visual quality within the project area.

Cumulative Impacts

Alternative 1 and both of the action alternatives would have no cumulative effect on scenery as management actions would be site specific and would not further contribute to improved or degraded visual character across the landscape.

Special Areas - Inventoried Roadless Areas and Wild and Scenic Rivers

Inventoried Roadless Areas

Alternative 1 (No Action)

There would be no change in the status of the Chevelon Canyon segments identified as an Inventory Roadless Area.

Alternatives 2 and 3-Modified

There are portions of the treatment areas that lie within the Chevelon Canyon Roadless Area. However, these portions are small areas on flat ground adjacent to Chevelon Canyon proper. For the purposes of restoration and wildlife habitat improvement, proposed activities listed in the alternatives can occur based on exceptions provided in 36 CFR 294.13; Prohibition of timber cutting, sale or removal in inventoried roadless areas.

Cumulative Impacts

As Inventoried Roadless areas are administratively designated. No alternative would have any cumulative effect on Inventoried Roadless Areas within and outside the project area.

Wild and Scenic Rivers

The National Wild and Scenic Rivers Act was established by Congress in 1968 to preserve the free-flowing rivers that possess certain “outstanding remarkable” values. Pursuant to Section 36 CFR 297.5(d)(1) of the Act, the Secretary of Agriculture requires the Forest Service to evaluate rivers within its jurisdiction for their potential for inclusion into the National Wild and Scenic Rivers System. The Apache-Sitgreaves National Forests evaluated rivers within its jurisdiction for analysis of the 1987 Forest Plan. No Wild and Scenic Rivers occur within the Larson project area. However, Chevelon Creek Wild and Scenic River is adjacent to the project area. This includes 499 acres of the quarter-mile management buffer of two segments.

Alternative 1 (No Action)

There would be no change in the status of the Chevelon Creek segments that are eligibility and suitability for Wild or Scenic Rivers.

Alternatives 2 and 3-Modified

The 499 acres that lies within the quarter mile management buffer of the two segments of Chevelon Creek are upland vegetation above the rim which does not contribute to the wild or scenic character of the river. Proposed activities within the 499 acres will have no adverse effect on the wild or scenic character of the river segments, and would be protected from adverse effects by the use of watershed design criteria listed in Appendix B.

Cumulative Impacts

As Wild and Scenic Rivers are administratively designated, no alternative would have any cumulative effect on Wild and Scenic River designations within and outside the project area.

Air Quality

The project area represents clear and clean air for many visitors and is important to the continued health of surrounding communities both economically and physically. Smoke, in general is a nuisance and can be adverse to health, but is also part of the natural disturbance associated with these types of ecosystems. Two criterion pollutants, carbon monoxide and particulate matter, are produced in wood smoke and are regulated by the Clean Air Act. The Arizona State Smoke Management Rule implements the Clean Air Act and contains regulations that all State and Federal natural resource agencies must follow before a prescribed burn is ignited.

Both prescribed fire and wildfire create smoke; however the amount and timing of these smoke events can be mitigated with prescribed fire. Prescribed burn planning ensures that effects from all burning within the area are mitigated and that Clean Air Act requirements are met. The three scenarios used in the Simple Approach Smoke Estimation Model (SASEM) analysis of smoke impacts can be used as a benchmark of the types of conditions and fuel loading burns should be conducted in. The communities of Forest Lakes and Heber/Overgaard would have the most smoke impacts due to their proximity to the project area and in line with prevailing winds. Less biomass being combusted in prescribed burning than if the area were to burn under higher severity wildfire would result in less smoke, therefore less emissions are expected in controlled situations (Wiedinmyer and Hurteau 2010).

Smoke Modeling Results

Six Class 1 airsheds were identified within an 80 mile radius of the project area. Seven communities were identified as smoke sensitive areas near the Larson Project area and were combined into four main areas. No current nonattainment areas exist within an 80 mile radius of the project area. Results from the three scenarios show that Class 1 airsheds south of the project area will not be impacted by burning in the project area under the prevailing south southwest winds. Smoke impacts to the communities of Heber / Overgaard and Forest Lakes are almost inevitable therefore consideration for smoke duration would be included in burn plans.

Table 30. SASEM results for Class 1 airsheds and Smoke Sensitive areas.

Air Quality SASEM Results for Both Action Alternatives (2 and 3-Modified)						
Air Quality type	Location	Distance From Rim Lakes Project area	Direction From Rim Lakes Project area	Scenario 1: Initial Broadcast	Scenario 2: Pile Burn	Scenario 3: Maint. Broadcast
				Kosh Visual Range (Miles)	Kosh Visual Range (Miles)	Kosh Visual Range (Miles)
Class 1 Airsheds	Mazatzal Wilderness	25	SW	No Impact	No Impact	No Impact
	Sierra Ancha Wilderness	25	SW	No Impact	No Impact	No Impact
	Mount Baldy Wilderness	75	SE	No Impact	No Impact	No Impact
	Petrified Forest NP	60	NE	75.4	>99.9	67.4
	Pine Mountain Wilderness	40	W	43.4	87.8	37.7
	Sycamore Cyn Wilderness	65	NW	83.2	>99.9	74.7
Smoke Sensitive Areas	Payson	15	SW	No Impact	No Impact	No Impact
	Heber / Overgaard	13	NE	8.7	16.7	1.8
	Winslow	60	NNE	75.4	>99.9	67.4
	Forest Lakes	0	N	52.6	1.4	6.5
Kosh Values taken under good stability conditions with 7mph winds. Kosh visual range is a measure of the distance in miles of visibility. The higher the number the more visibility therefore the less the impact from smoke PM-2.5 emissions.						

When comparing alternatives, both action alternatives propose prescribed burning which will have an impact on surrounding communities but in a controllable manner. The outcome of these alternatives would also reduce the amount of biomass available to burn during wildfire which would reduce the impact of smoke. Alternative 1 does not propose any prescribed burning; however, it would continue to maintain large amounts of biomass available for consumption in the event of a wildfire which will have direct and most likely uncontrollable impacts on recreation, the seven class 1 airsheds within 80 miles of the project area and surrounding communities.

Transportation

Existing Condition

Currently there are approximately 244 miles of NFS roads within the project area, this includes three miles of Arizona State Highway 260, under easement to Arizona Department of Transportation (ADOT). Of these 244 miles, approximately 81 miles are Maintenance Level (ML) 2-5, open roads and approximately 163 miles are ML 1, closed roads. There are approximately 45 miles of unauthorized roads that have been identified and mapped for a total of approximately 249 miles of roads on Forest Service lands within the analysis area. A detailed listing of each system road, maintenance level and length in the analysis area can be found in the Transportation Report.

Table 31: Larson Forest Restoration Project Area Existing Road Mileage Summary

Maintenance Level ML	Miles
1- Basic Custodial Care (closed)	163.33
2 – High Clearance	42.55
3 – Suitable for Passenger Vehicles	34.71
4 – Moderate Degree of User Comfort	0
5 – High Degree of User Comfort (Arizona State Highway 260)	3.12
Total System Roads	243.72
Total Open System Roads	80.87
Total Identified Unauthorized Roads	44.90

Road Density

The project is a series of ridge tops and deep canyons running South to North, dictating the need for the higher density of roads for treatment access but not for regular administrative and recreational use.

Table 32: Road Density for Larson Forest Restoration Project Area

Description of Roads used to calculate the density	Density Mi/ Mi ²
Total Larson Forest Restoration Project Area	46.94
Total Project Area Road Density Not including Unauthorized Roads	5.19
Total Project Area Road Density Including Unauthorized Roads	6.15
Open Project Area Road Density Not Including Unauthorized Roads	1.73
Open Project Area Road Density Including Unauthorized Roads	2.68

Environmental Effects

Alternative 1 – No Action

Under Alternative 1, current road management would continue, no treatments would be performed and the existing road system within the project area would not change. Current total road density and open road density would remain unchanged. No ML-1 (closed) roads would be temporarily opened. Routine road maintenance activities would continue primarily on Maintenance level 3 roads, limited basis on Level 1 & 2 roads. State Hwy. 260 (ML5) is maintained by ADOT. Unauthorized routes would not be decommissioned and would continue to erode and transport sediment.

Alternative 2 and 3-Modified

Accessing the 30,041 acres for vegetation treatment over the entire project area would require the use of approximately 88 miles of existing open National Forest system roads ML-2 through ML-5. And it would require that approximately 155 miles of currently closed ML-1 roads be opened temporarily to access units. Opening these roads would include the removal of closure treatments (e.g. earth berms, boulders, logs, etc.). All closed ML-1 roads that are temporarily opened would be closed again as soon as access is no longer needed to that unit. This would be accomplished by constructing waterbars, scarifying and seeding the road bed and using earthen berms, boulders or other suitable closure devices at the entrance. Construction of new temporary roads would be limited to 2 miles. At this time there are no temporary roads planned. The use of temporary roads would be to provide access to treatment areas and minimize skidding distances .

Road Maintenance of system roads may include activities described in the Forest Service Operations and Maintenance handbook (FSH 7709.59) such as, but not limited to;

- Road blading – reshape roadway template, remove ruts and wash boards to provide a smooth running surface;
- Drainage structure maintenance – installing and/ or maintaining drainage features (grade dips, lead out ditches, culvert inlet and outlet cleaning, hardening of natural crossings);
- Spot borrow and surfacing – placement of aggregate and/or pit run as necessary to re-establish road templates, armor roadway shoulders, construct drainage dips, harden soft spots to improve load bearing where rutting and/ or pumping are evident; Clearing - removal of road side vegetation for site distance,

Dust abatement, and installation of temporary warning signs would also occur. Dust abatement is expected to be used on approximately five miles of ML3 system roads. A combination of Magnesium Chloride and Lignin would be the dust abatement product of choice.

Road improvement activities would occur on approximately five miles of roadway within the project area. Activities included in road improvement activities include, but are not limited to , widening curves to improve turn radii, installing turnouts to improve haul safety, hardening water crossings and changing alignments at road intersections to improve site distance and haul safety.

8.5 miles of ML 1 system roads , .5 miles of ML 2 system roads and 45 miles of unauthorized roads have been identified as not needed and would be decommissioned under this restoration project. Although this would decrease the total road density in the project area the total road density of the area would remain higher than the plan standard and guideline. The Open road density would decrease bringing it into compliance with the standard and guideline.

Cumulative Effects

Alternative 1 – No Action

A decision on the Environmental Impact Statement for Public Motorized Travel management in accordance with the travel management rule is expected in early 2016. The travel Management Rule requires designating a system of motorized routes open to public travel, and includes prohibiting motor vehicle use off the designated National Forest with exceptions and exemptions.

The proposed action would take precedence over the current road maintenance levels identified for the roads within the Larson Forest Restoration Project Area. This action would decrease the continuing development of unauthorized roads from off road motorized vehicle us.

Alternative 2 & 3-Modified

During treatment activities involving removal of product additional road maintenance would be required than what is currently occurring to minimize road degradation from more frequent use and heavy trucks. A decision on the Environmental Impact Statement for Public Motorized Travel management in accordance with the travel management rule is expected in early 2016. The Travel Management Rule (TMR) requires designating a system of motorized routes open to public travel, and includes prohibiting motor vehicle use off the designated National Forest. The proposed action would take precedence over the road maintenance levels identified for the roads within the Larson Forest Restoration Project Area. The proposed transportation system, road maintenance levels and recommended decommissioned roads was developed using the TAP and referring to the 2008 TAP report.

Socio-Economics

With the exceptions of the economic benefit of contracting to local industries and the varied opinions from the public on forest restoration activities, there were no issues tied to socio-economics. This project does not manage for or include actions tied to socio-economics and there are no effects to project area socioeconomics. This resource was analyzed and documented in a Socio-Economic report.

Climate Change

All background information on climate change is from Malmsheimer et al. (2008) unless otherwise noted. Climate shapes our forests and forests shape our climate. The Larson project is proposed on a local scale and is not intended to have cumulative effects that are measurable on a global scale in regards to climate change; however, management of the Larson area has a small scale effect on mitigating climate change when combined with other management actions regionally. Ninety-eight percent of the Larson project is currently considered overstocked and at risk for stand-replacing fires which are the greatest cause of carbon release or greenhouse gases (GHG). Both alternatives 2 and 3-Modified reduce the fire hazard within the project area associated with stand-replacing fires.

None of the alternatives affect forest carbon storage to any measurable level. Alternative 1 has the highest potential to release carbon in a relatively large quantity over a short period of time, due to increased fire hazard with increased risk of stand-replacing wildfire.

Environmental Justice

Executive Order 12898, Environmental Justice, requires all federal agencies to consider the effect of a proposed action on low income and minority populations. From the 2000 Census data, 79.4% of the population in Coconino County and 42% in Navajo County is white, 27% of the population in Coconino County and 47% of Navajo County is Native American, and the Hispanic or Latino population estimated at 13% in Coconino County and 8% in Navajo County (2010 US Census). Figures for landownership by race or ethnicity are not available specifically for the project area; however, there is no information that would suggest any higher proportion of minority populations. The average household incomes in Coconino County of \$48,723 and Navajo County of \$36,904 are well above the \$16,895 that is considered the Federal Poverty Guideline. Based on these numbers, implementation of any alternative would not be expected to have any negative impacts to low income or minority population.

Finding of No Significant Impact

As the responsible official, I am responsible for evaluating the effects of the project relative to the definition of significance established by the CEQ Regulations (40 CFR 1508.13). I have reviewed and considered the EA and documentation included in the project record, and I have determined that the proposed action and alternatives will not have a significant effect on the quality of the human environment. As a result, no environmental impact statement will be prepared. My rationale for this finding is as follows, organized by sub-section of the CEQ definition of significance cited above.

Context

For the proposed action and alternatives the context of the environmental effects is based on the environmental analysis in this EA.

The significance of the proposed action and alternatives has been analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. This project would contribute to restoration across the landscape. Those affected by this project during implementation activities and in the short term would include local residents and homeowners and recreationists.

The Larson project area is on the western third of the of the 819,442 acre Sitgreaves National Forest. The proposed action would treat approximately 25,000 acres or three percent of the Forest. The treatments, spread across a 30,000-acre area of Forest would leave a more diverse landscape of different conditions.

Intensity

Intensity is a measure of the severity, extent, or quantity of effects, and is based on information from the effects analysis of this EA and the references in the project record. The effects of this project have been appropriately and thoroughly considered with an analysis that is responsive to concerns and issues raised by the public. The agency has taken a hard look at the environmental effects using relevant scientific information and knowledge of site-specific conditions gained from field visits. My finding of no significant impact is based on the context of the project and intensity of effects using the ten factors identified in 40 CFR 1508.27(b).

Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

My finding of no significant environmental effects is not biased by the beneficial effects of the action. The effects to all resources of implementing the proposed action or alternative were disclosed in the EA and were determined to be local in context and short term in duration. In addition, implementation of project design features and best management practices as described in the EA, Appendix B, starting on page 122, would further reduce project impacts.

The degree to which the proposed action affects public health or safety.

There would be no significant effects on public health and safety. The purpose of this project is to restore ecosystem components within the project area which include reducing hazardous fuels that could contribute to wildfire behavior that threatens private property. Treating vegetation and

improving watershed conditions minimizes the threat from events such as wildfires and flots to the safety of the public. Initiation of prescribed burning activities would only occur when weather conditions are favorable to help ensure control. Indicators include higher humidity and lower wind speeds and temperatures that would maintain lower fire intensities. Short term impacts to air quality may result from prescribed burning; however, all burning operations would be conducted in compliance with standards prescribed by Arizona Department of Environmental Quality (ADEQ).

Unique characteristics of the geographic area such as the proximity to historical or cultural resources, parklands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

There would be no effect to unique characteristics within the project area that would be significantly affected by treatment activities. Analysis in the EA did not identify the presence of any park lands, or prime farmlands. Ecologically critical areas identified were Mexican Spotted Owl and Northern Goshawk habitat, but these areas are either being managed to the benefit of these species or avoided.

The degree to which the effects on the quality of the human environment are likely to be highly controversial.

The effects on the quality of the human environment are not likely to be highly controversial. Controversy, in this context, refers to opposing scientific opinions, not public opposition to a project. It is generally accepted that reducing the amount of hazardous fuel lowers the potential for high intensity wildfire behavior and addressing watershed and wildlife through restoration leads to improved conditions.

The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

The Forest Service has considerable experience with the types of activities to be implemented. The analysis of the expected effects on all affected resources is disclosed in the EA. No unknown or unique risks were identified in the EA. The environmental effects and associated risks of the types of treatments analyzed in the EA have been documented in many studies and post treatment monitoring has not disclosed adverse effects.

The degree to which the action may establish precedent for future actions with significant effects or represents a decision in principle about a future consideration.

The implementation of this project would not establish a precedent for future actions or represent a decision in principle about a future consideration. The proposed action and alternative would not be a major departure from the types of activities common to the Apache-Sitgreaves National Forests. Additionally, decisions made in regards to activities within this project area would not commit the Forest Service to actions on lands outside this project area.

Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

From analysis completed by all resource specialists, the effects of implementing the supplemental proposed action does not individually, nor when considered with other past, present or reasonably foreseeable future actions near the project area, reach a level of significance. Treatments would only occur where appropriate, and their impacts would be reduced by project design and best management practices. For these reasons, I have determined the cumulative impacts of the project would not have a significant effect.

The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

The project area has been inventoried for cultural resources. All cultural resources are evaluated for eligibility to the National Register of Historic Places according to the criteria described in 36 CFR 60.4.

The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

As required by the Endangered Species Act (ESA), analysis of the project area was completed to determine that supplemental proposed action and alternative is "...not likely to jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of their critical habitats".

The activities described in proposed action and alternative are not likely to adversely affect any endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act. The list of endangered and threatened, and sensitive species analyzed for this project can be found in this EA on pages 14-26). Biological Evaluations for threatened, endangered, and sensitive plants, wildlife, and fish were conducted and concluded that implementation of the supplemental proposed action would have little or no effect/impact to these species (pages 51-92).

Interagency cooperation with the U.S. Fish and Wildlife Service was conducted (Wildlife Biologist's Report). The Biological Evaluations have been summarized in the EA and are located in the project file. Design criteria and best management practises for the protection of wildlife habitats are presented in Appendix B of this document.

Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

The activities of this project would not violate applicable federal, state, or local laws enacted for the protection of the environment. The decision to implement the Selected Alternative is consistent with the goals and objectives as stated in the 1987 Land and Resource Management Plan for the Apache-Sitgreaves National Forest (Forest Plan). In addition, the proposed action and alternative meets the

requirements of the Healthy Forests Restoration Act (2003), the Clean Air Act (1990), the Clean Water Act (1972), the National Forest Management Act (1976), the Multiple Use-Sustained Yield Act of 1960, the National Environmental Policy Act (1969), and the National Historic Preservation Act of 1966 as amended.

Findings Required by Other Laws and Regulations

Irreversible Resource Commitments and Irretrievable Losses (General)

The physical and biological effects are limited to the project area and/or immediate adjacent areas. There are no known significantly irreversible resource commitments or any significant irretrievable losses of vegetation resources, wildlife habitats, soil productivity, water quality, or other renewable resources.

Environmental Justice

In accordance with Executive Order 12898, I have determined this project would not have a disproportionately adverse health or environmental effect on low income or minority populations (EA, p. 103).

Effects on Floodplains and Wetlands

There are floodplains and wetlands within the project area. These areas would not experience any significant adverse effects from management activities. The floodplains within the project area would not receive measurable impact by upstream influences. Management activities designed to protect these resources conform to the federal regulations for floodplains (Executive Order 11988) and wetlands (Executive Order 11990).

Invasive Species Executive Order 13112 of February 3, 1999

Land actions that disturb the ground have the potential to contribute to the spread of noxious weeds and other non-native plants. The project will incorporate integrated weed management measures. The analysis conducted in the Environmental Assessment for the Noxious Weed Management Plan determined noxious weed control actions are consistent with laws and regulations applicable to the management of National Forest System lands and resources. Part of the purpose and need of this project is to lower existing fuel loads to reduce the risk of catastrophic wildfire. With the risk of wildfire comes the potential of large-scale spread of invasive species over a greater area. Compared with this potential, the benefits of the project outweigh the potential harm of invasive species.

Chapter 4 – Consultation and Coordination

The following Forest Service employees served on the interdisciplinary team to complete the analysis for this project.

Interdisciplinary Team Members

Name	Title	Responsibility
Jim Zornes	Forest Supervisor	Deciding Officer
Chris James	District Ranger	Recommending Officer
Cody Hutchinson	Forest Environmental Coordinator	ID Team Leader, Socio-Economics, NEPA documentation.
Susan Henshaw	NEPA Coordinator (transferred)	Project Initiation, Scoping, NEPA Documentation
David Seery	Wildlife Biologist	Assistant ID Team Leader, Wildlife report, consultation with USFWS
Rachael Vaughn	Wildlife Biologist	Wildlife analysis
Gayle Richardson	Silviculturist	Forest Vegetation and Prescriptions, Climate Change
Dave Mauer	Sitgreaves Zone Timber Management Officer	Implementation Effectiveness. Timber Operations
John Manthei	Fuels Specialist	Fire/Fuels Analysis, Air Quality
Deborah MacIvor	Forest Engineer	Engineering/Transportation
John Rihs	Hydrologist	Hydrology and Soils
Joseph Martin	Sitgreaves Zone Archaeologist	Heritage Resources
Meckenzie Helmandollar-Powell	Recreation Specialist	Recreation Analysis
Kendall Hughes	Sitgreaves Zone Range Staff	Range and Noxious Weeds
Steven Richardson	Geographic Information Systems Coordinator	Maps, Data Analysis

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:

Federal and State Officials and Agencies

Natural Resources Conservation Service
US Fish and Wildlife Service
US House of Representatives – Office of Raul Grijalva
US House of Representatives – Office of Ann Kirkpatrick
US Senate – Office of Jon Kyl
US Senate – Office of John McCain
Arizona House of Representatives - Office of Jack Brown
Arizona House of Representatives – Office of Lucy Mason
Arizona House of Representatives – Office of Andrew Tobin
Arizona Senate – Office of Sylvia Allen
Arizona Department of Environmental Quality
Arizona Department of Transportation
Arizona Game and Fish Department
Arizona State Forestry
Arizona State Historical Preservation Office
University of Northern Arizona
Coconino County
Navajo County
Town of Heber
Town of Overgaard
Town of Payson
Town of Winslow

Tribes

White Mountain Apache Tribe
San Carlos Apache Tribe
Tonto Apache Tribe
Yavapai-Apache Nation
Yavapai-Prescott Tribe
Ft. McDowell Yavapai Indian Nation
Hopi Tribe
Navajo Nation
Pueblo of Zuni

Others

Scoping list available upon request.

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Appendix A – 1987 Forest Plan Amendment Tables

Forest Plan Amendment #1	
Existing Guideline Language Apache-Sitgreaves Land and Resource Management Plan (2009 update) Pages 56-58	Proposed New Guideline Language
Management Scale	
Distribution of habitat structures (tree size and age classes, tree groups of different densities, snags, dead and down woody material, etc.) should be evaluated at the ecosystem management area level, at the mid-scale such as drainage, and at the small scale of site.	Distribution of habitat structures (tree size and age classes, tree density, snags, dead and down woody material, etc.) should be evaluated at the ecosystem management area level, at the mid-scale such as drainage, and at the small scale of site.
Where VSS 6 is deficit within the ecosystem management area, all VSS 6 will be maintained regardless of location. However, over time, the intent is to sustain a relatively even distribution (again, based on site quality) of VSS 6 across the ecosystem management area.	Where VSS 6 is deficit within the ecosystem management area, all VSS 6 will be maintained regardless of location, except in situations when occasional trees may be removed in order to provide for understory health and development. For example, the exemption might be used for protection of young tree groups from diseased overstory trees. Threats to public health and safety would be another example when this exception is exercised. However, over time, the intent is to sustain a relatively even distribution (again, based on site quality) of VSS 6 across the ecosystem management area.

Existing Guideline Language Apache-Sitgreaves Land and Resource Management Plan (2009 update) Pages 56-58	Proposed New Guideline Language
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Guidelines	
Vegetation Management	
<i>Landscapes Outside Goshawk Post-Fledgling Family Areas</i>	
No similar direction in forest plan.	General: Within ponderosa pine stands, manage over time for uneven-aged stand conditions composed of heterogeneous mosaics of tree groups and single trees, with interspaces between tree groups. The size of tree groups, as well as sizes and shapes of interspaces should be variable.
No similar direction in forest plan.	Manage to develop and maintain a highly diverse vegetation mosaic: 60–80 percent of the uneven-aged stand should be under conifer and deciduous tree crowns.
General: The distribution of vegetation structural stages for ponderosa pine, mixed conifer, and spruce-fir forests is 10 percent grass–forb–shrub (VSS 1), 10 percent seedling-sapling (VSS 2), 20 percent young forest (VSS 3), 20 percent mid-aged forest (VSS 4), 20 percent mature forest (VSS 5), 20 percent old forest (VSS 6). NOTE: The specified percentages are	For the areas managed for tree crown development, the distribution of vegetation structural stages for ponderosa pine, mixed conifer, and spruce-fir forests is 10 percent grass–forb–shrub (VSS 1), 10 percent seedling-sapling (VSS 2), 20 percent young forest (VSS 3), 20 percent mid-aged forest (VSS 4), 20 percent mature forest (VSS 5), and 20 percent old forest (VSS 6). Note: the specified

a guide and actual percentages are expected to vary + or – up to 3 percent.	percentages are a guide and actual percentages are expected to vary plus or minus up to 3 percent.
<i>Landscapes Outside Goshawk Post-Fledgling Family Areas</i>	
No similar direction in forest plan.	Manage to develop and maintain 20–40 percent of the uneven-aged stand as canopy gaps (VSS 1 and VSS 2) and interspaces between tree groups. Interspaces consist of mixtures of grass, forbs, shrubs, scattered single trees, and small areas of nonforested conditions.
No similar direction in forest plan.	Tree group spatial distribution may be highly variable based on local site and current conditions; the interspaces between groups may range from 20–200 feet, but generally between 40 and 100 feet apart from drip line to adjacent drip line. This spacing of groups is not affected by single trees in the interspaces.
No similar direction in forest plan.	Natural meadows, grasslands, savanna grasslands, wetlands, talus slopes, and other nontree dominated areas may also occur as inclusions within the general forest; these inclusions will not be managed for forest conditions, and are not included within the uneven-aged stand structure.
No similar direction in forest plan.	Over time the spatial location of the tree groups and interspaces may shift within the uneven-aged stand.
No similar direction in forest plan.	Each tree group is generally dominated by one vegetation structure stage. The spatial arrangement of trees, high dispersion of VSS structural stage diversity, and interspaces comprise each uneven-aged forest stand. Collectively these stands aggregate to uneven-aged forest landscapes, similar to natural conditions.
The distribution of VSS, tree density, and tree age are a product of site quality in the ecosystem management area. Use site quality to guide in the distribution of VSS, tree density, and tree ages. Use site quality to identify and manage dispersal PFA and nest habitat at 2 to 2.5 mile spacing across the landscape.	No change.
Snags are 18 inches or larger d.b.h. and 30 feet or larger in height, downed logs are 12 inches in diameter and at least 8 feet long, woody debris is 3 inches or larger on the forest floor, canopy cover is measured with vertical crown projection on average across the landscape.	Snags are 18 inches or larger d.b.h. and 30 feet or larger in height, downed logs are 12 inches in diameter and at least 8 feet long, woody debris is 3 inches or larger on the forest floor.
The order of preferred treatment for woody debris is: (1) prescribed burning, (2) lopping and scattering, (3) hand piling or machine grapple piling, and (4) dozer piling.	No change.
Canopy Cover: Canopy cover guidelines apply only to mid-aged to old forest structural stages (VSS 4, VSS 5, and VSS 6) and not to grass–forb–shrub to young forest structural stages (VSS 1, VSS 2, and VSS 3).	Canopy Cover: Canopy cover is evaluated with vertical crown projection within mid-aged to old forest structural stage groups (VSS 4, VSS 5, and VSS 6) and not within grass–forb–shrub to young forest structural stage groups (VSS 1, VSS 2, and VSS 3) or in interspaces, natural meadows, and grasslands, or other areas not managed for forest conditions.
Spruce-Fir: Canopy cover for mid-aged forest (VSS 4) should average 1/3 60 percent and 2/3 40 percent, mature forest (VSS 5) should average 60+ percent, and old forest (VSS 6) should average 60+ percent.	No change.

Maximum opening size is 1 acre with a maximum width of 125 feet. Provide two groups of reserve trees per acre with six trees per group when opening size exceeds 0.5. Leave at least 3 snags, 5 downed logs, and 10–15 tons of woody debris per acre.	
Mixed Conifer: Canopy cover for mid-aged forest (VSS 4) should average 1/3 60+ percent and 2/3 40+ percent, mature forest (VSS 5) should average 50+ percent, and old forest (VSS 6) should average 60+ percent. Maximum opening size is up to 4 acres with a maximum width of up to 200 feet. Retain one group of reserve trees per acre of three to five trees per group for openings greater than 1 acre in size. Leave at least three snags, five downed logs, and 10–15 tons of woody debris per acre.	No change.
Ponderosa Pine: Canopy cover for mid-aged forest (VSS 4) should average 40+ percent, mature forest (VSS 5) should average 40+ percent, and old forest (VSS 6) should average 40+ percent. Opening size is up to 4 acres with a maximum width of up to 200 feet. One group of reserve trees, three to five trees per group, will be left if the opening is greater than an acre in size. Leave at least two snags, three downed logs, and 5–7 tons of woody debris per acre.	Ponderosa Pine: Canopy cover for mid-aged forest (VSS 4) should average 40+ percent, mature forest (VSS 5) should average 40+ percent, and old forest (VSS 6) should average 40+ percent within tree groups. One group of reserve trees, three to five trees per group, will be left in created regeneration openings greater than an acre in size. Leave at least two snags per acre, three downed logs per acre, and 5–7 tons of woody debris per acre.
Woodland: manage for uneven-age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape. Provide for reserve trees, snags, and down woody debris.	No change.
<i>Landscapes Inside Goshawk Post-Fledgling Family Areas</i>	
General: Provide for a healthy sustainable forest environment for the post-fledgling family needs of goshawks. The principle difference between “within the post-fledgling family area” and “outside the post-fledgling family area” is the higher canopy cover within the post-fledgling family area and smaller opening size within the post-fledgling family area. Vegetative structural stage distribution and structural condition are the same within and outside the post-fledgling family area.	No change.
No similar direction in forest plan.	Canopy cover is evaluated with vertical crown projection within mid-aged to old forest structural stages groups (VSS 4, VSS 5, and VSS 6) and not within grass-forb-shrub to young forest structural stage groups (VSS 1, VSS 2, and VSS 3) or in interspaces, natural meadows and grasslands, or other areas not managed for forest conditions.

Forest Plan Amendment #2	
Existing Guideline Language Apache-Sitgreaves Land and Resource Management Plan (2009 update) Pages 87 - 90	Proposed New Standard or Guideline Language
Mexican Spotted Owl	
Standards	
No similar direction in forest plan.	The project will comply with the biological assessment that has been developed in consultation with the United States Fish and Wildlife Service (USFWS).
Provide three levels of habitat management – protected, restricted, and other forest and woodland types to achieve a diversity of habitat conditions across the landscape.	Provide three levels of habitat management – protected, recovery , and other forest and woodland types to achieve a diversity of habitat conditions across the landscape.
Protected areas include delineated protected activity centers; mixed conifer and pine-oak forests with slopes greater than 40% where timber harvest has not occurred in the last 20 years; and reserved lands which include wilderness, research natural areas, wild and scenic rivers and congressionally recognized wilderness study areas.	Protected areas include delineated protected activity centers; mixed conifer and pine-oak forests.
Restricted areas include all mixed-conifer, pine-oak, and riparian forests outside of protected areas.	Recovery areas include all mixed-conifer, pine-oak, and riparian forests outside of protected areas.
Other forest and woodland types include all ponderosa pine, spruce-fir, woodland, and aspen forests outside protected and restricted areas.	Other forest and woodland types include all ponderosa pine, spruce-fir, woodland, and aspen forests outside protected and recovery areas.
Survey all potential spotted owl areas including protected, restricted, and other forest and woodland types within an analysis area plus the area ½ mile beyond the perimeter of the proposed treatment area.	Survey all potential spotted owl areas including protected, recovery , and other forest and woodland types within an analysis area plus the area ½ mile beyond the perimeter of the proposed treatment area.
Establish a protected activity center at all Mexican spotted owl sites located during surveys and all management territories established since 1989.	No change.
Allow no timber harvest except for fuelwood and fire risk abatement in established protected activity centers. For protected activity centers destroyed by fire, windstorm, or other natural disasters, salvage timber harvest or declassification may be allowed after evaluation on a case-by-case basis in consultation with the US Fish and Wildlife Service.	Allow no timber harvest except for fuelwood and fire risk abatement in established protected activity centers. Allow firewood, fire risk abatement, and habitat structure improvement in the following established protected activity centers: Little Wildcat, Slim Jim, Potato, Woods Canyon, and Long Tom. For protected activity centers destroyed by fire, windstorms, or other natural disasters, salvage timber harvest or declassification may be allowed after evaluation on a case-by-case basis in consultation with the US Fish and Wildlife Service.
Allow no timber harvest except for fire risk abatement in mixed conifer and pine-oak forests on slopes greater than 40% where timber harvest has not occurred in the last 20 years.	No change.
Limit human activity in protected activity centers during the breeding season.	No change.
In protected and restricted areas, when activities conducted in conformance with these standards and guidelines may adversely affect other threatened, endangered, or sensitive species or may conflict with other established recovery plans or conservation agreements; consult with the US Fish and Wildlife Service to resolve the conflict.	In protected and recovery areas, when activities conducted in conformance with these standards and guidelines may adversely affect other threatened, endangered, or sensitive species or may conflict with other established recovery plans or conservation agreements; consult with the US Fish and Wildlife Service to resolve the conflict.

Monitor changes in owl populations and habitat needed for delisting.	No change.
Guidelines	
A. General	
Conduct surveys following Region 3 survey protocol. Breeding season is March 1 to August 31	No change.
B. Protected areas (Protected Activity Centers)	
Delineate an area of not less than 600 acres around the activity center using boundaries of known habitat polygons and/or topographic features. Written justification for boundary delineation should be provided.	No change.
The Protected Activity center boundary should enclose the best possible owl habitat configured in as compact a unit as possible, with the nest or activity center located near the center.	No change.
The activity center is defined as the nest site. In the absence of a known nest, the activity center should be defined as a roost grove commonly used during breeding. In the absence of a known nest or roost, the activity center should be defined as the best nest/roost habitat.	No change.
Protected Activity Center boundaries should not overlap.	No change.
Submit protected activity center maps and descriptions to the recovery unit working group for comment as soon as possible after completion of surveys.	No change.
Road or trail building in protected activity centers should be avoided but may be permitted on a case-by-case basis for pressing management reasons.	No change.
Generally allow continuation of the level of recreation activities that was occurring prior to listing.	No change.
Require bird guides to apply for obtain a special use permit. A condition of the permit shall be that they obtain a sub permit under the U.S. Fish and Wildlife Service Master endangered species permit. The permit should stipulate the sites, dates, number of visits and maximum group size permissible.	No change.
Harvest fuelwood when it can be done in such a way that effects on the owl are minimized. Manage within the following limitations to minimize effects on the owl: - Retain key forest species such as oak. - Retain key habitat components such as snags and large downed logs. - Harvest conifers less than 9 inches in diameter only within those protected activity centers treated to abate fire risk as described below:	Harvest fuelwood when it can be done in such a way that effects on the owl are minimized. Manage within the following limitations to minimize effects on the owl: - Retain key forest species such as oak. - Retain key habitat components such as snags and large downed logs. - Harvest conifers less than 16 inches in diameter only within those protected activity centers treated to abate fire risk as described below:
Treat fuel accumulations to abate fire risk: - Select for treatment 10% of the protected activity centers where nest sites are known in each recovery unit having high fire risk conditions. Also select another 10% of the protected activity centers where nest sites are known as a paired sample to serve as control areas. - Designate a 100-acre “no treatment” area around the known nest site of each selected	Treat fuel accumulations to abate fire risk: - The percentage of treatment within the protected activity centers will be determined through consultation with FWS. - Designate a 100-acre “no mechanical treatment” area around the known nest site of each selected

protected activity center. Habitat in the no treatment area should be as similar as possible in structure and composition as that found in the activity center. • Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel treatment and prescribed broadcast burning to abate fire risk in the remainder of the selected protected activity center outside the 100-acre “no treatment” area. • Retain woody debris larger than 12 inches in diameter, snags, clumps of broad-leafed woody vegetation, and hardwood trees larger than 10 inches in diameter at the root collar • Select and treat additional protected activity centers in 10% increments if monitoring of the initial sample shows there were no negative impacts or there were negative impacts which can be mitigated by modifying treatment methods. • Use light prescribed burns in non-selected protected activity centers on a case by case basis. Burning should avoid a 100-acre “no treatment” area around the activity center. Large woody debris, snags, clumps of broad-leafed woody vegetation should be retained and hardwood trees larger than 10 inches diameter at the root collar. • Pre-and post-treatment monitoring should be conducted in all protected activity centers treated for fire risk abatement (see monitoring guidelines).	protected activity center. Habitat in the no treatment area should be as similar as possible in structure and composition as that found in the activity center. • Use combinations of thinning trees less than 16 inches in diameter, mechanical fuel treatment and prescribed broadcast burning to abate fire risk in the remainder of the selected protected activity center outside the 100-acre “no mechanical treatment” area. • No change. • Mechanically treat as needed up to 20% of the non-core PAC area within an EMU identified through the landscape-level assessment. • Planned ignitions (prescribed broadcast burning) and unplanned ignitions (wildland fire) should be allowed to enter cores only if they are expected to burn with low fire severity and intensity. Large woody debris, snags, clumps of broad-leafed woody vegetation should be retained and hardwood trees larger than 10 inches diameter at the root collar. • No change.
Steep slopes (Mixed conifer and pine-oak forests outside protected activity centers with slopes greater than 40 % that have not been logged within the past 20 years). This management category has been removed from the current MSO recovery plan (2012), therefore it will not be addressed in this site-specific plan amendment.	
No seasonal restrictions apply.	Deleted.
Treat fuel accumulations to abate fire risk: • Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed broadcast burning. • Retain woody debris larger than 12 inches in diameter, snags, clumps of broad-leafed woody vegetation, and hardwood trees larger than 10 inches in diameter at the root collar. • Pre-and post-treatment monitoring should occur within all steep slopes treated for fire risk abatement (see monitoring guidelines).	Deleted.
C. Restricted Areas	Recovery Habitat
Mixed Conifer and Pine-oak Forests: Manage to ensure a sustained level of owl nest/roost habitat well distributed across the landscape. Create replacement owl nest/roost habitat where appropriate while providing a diversity of stand conditions across the landscape to ensure habitat for a diversity of prey species.	No change.
The minimum percentage of mixed conifer and pine-oak restricted area habitat which should be managed to have nest/roost characteristics includes 10% at 170	Minimum desired conditions for mixed-conifer and pine-oak forest areas managed for recovery nesting/roosting habitat within the UGM EMU are as follows:

basal area and an additional amount of area at 150 basal area. The additional area of 150 basal area is +10% in BR-E and +15% in all other recovery units. The variables are for stand averages and are minimum threshold values and must be met simultaneously. In project design, no stands simultaneously meeting or exceeding the minimum threshold values should be reduced below the threshold values unless a district wide or larger landscape analysis or restricted areas shows that there is a surplus of restricted area acres simultaneously meeting the threshold values. Management should be designed create minimum threshold conditions on project areas where there is a deficit of stands simultaneously meeting minimum threshold conditions unless the district-wide or larger landscape analysis shows there is a surplus.	<u>Mixed conifer</u>: A minimum of 25% of area to be managed for threshold conditions with >30% in both the 12-18 inches and >18 inches size classes, with minimum tree BA of 120 sq. ft. per acre and minimum large tree (>18 inches dbh) density of 12 per acre. <u>Pine-oak</u>: A minimum of 10% of area to be managed for threshold conditions with >30% in both the 12-18 inches and >18 inches size classes, a minimum tree BA of 110 sq. ft. per acre and minimum large tree (>18 inches dbh) density of 12 per acre.
Attempt to mimic natural disturbance patterns by incorporating natural variation, such as irregular tree spacing and various patch sizes, into management prescriptions.	No change.
Maintain all species of native trees in the landscape including early serial species	No change.
Allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure.	No change.
Emphasize uneven-aged management systems. However, both even-aged and uneven-aged system may be used where appropriate to provide variation in existing stand structure and species diversity. Existing stand conditions will determine which system is appropriate.	No change.
Extend rotation ages for even-aged stands to greater than 200 years. Silvicultural prescriptions should explicitly state when vegetative manipulations will cease until rotation age is reached.	No change.
Save all trees greater than 24 inches dbh.	No change.
In pine-oak forests, retain existing large oaks and promote growth of additional large oaks.	No change.
Encourage prescribed and prescribed natural fire to reduce hazardous fuel accumulations. Thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire.	No change.
Retain substantive amounts of key habitat components: • Snags 18 inches in diameter and larger • Down logs over 12 inches midpoint diameter • Hardwoods for retention, recruitment, and replacement of large hardwoods.	No change.
Riparian Areas: Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation,, stream banks, and channels should be prevented.	No change.
Domestic Livestock Grazing: Implement forest plan forage utilization standards and guidelines to maintain owl prey availability, maintain potential for beneficial fire while inhibiting potential destructive fire, maintain and restore riparian ecosystems, and promote development of owl habitat. Strive to attain good to	No change.

excellent range conditions.	
Old Growth: Except where otherwise noted, implement forest plan old growth standards and guidelines to maintain and promote development of owl habitat.	No change.
D. Other Forest and Woodland Types – No changes proposed for Section D.	
E. Guidelines for Specific Recovery Units – No changes proposed for Section E.	
F. Monitoring Guidelines	
In protected and restricted areas where silvicultural or fire abatement treatments are planned, monitor treated stands pre- and post-treatment to determine changes and trajectories in fuel levels; snag basal areas; live tree basal areas; volume of down logs over 12 inches in diameter; and basal area of hardwood trees over 10 inches in diameter at the root crown.	Conduct project and non-project area monitoring of Mexican spotted owl protected activity centers and northern goshawk post-fledgling areas in accordance to species' specific protocols.
Monitoring and evaluation should be collaboratively planned and coordinated with involvement from each national forest, USFWS Ecological Services Field Office, USFWS Regional Office, USDA Forest Service Regional Office, Rocky Mountain Research Station, recovery team, and recovery unit working groups.	No change.
Population monitoring should be a collaborative effort with participation of all appropriate resource agencies.	No change.
Habitat monitoring of gross habitat changes should be a collaborative effort of all appropriate resource agencies.	No change.
Habitat monitoring of treatment effects (pre- and post-treatment) should be done by the agency conducting the treatment.	No change.
Prepare an annual monitoring and evaluation report covering all levels of monitoring done in the previous year. The annual report should be forwarded to the Regional Forester with copies provided to the recovery unit working groups, USFWS Ecological Services field offices, and the USFWS Regional Offices.	No change.
Range wide: Track gross changes in acres of owl habitat resulting from natural and human caused disturbances. Acreage changes in vegetation composition, structure, and density should be tracked, evaluated, and reported. Remote sensing techniques should provide an adequate level of accuracy.	No change.
In protected and restricted areas where silvicultural or fire abatement treatments are planned, monitor treated stands pre- and post-treatments to determine changes and trajectories in fuel levels; snag basal areas; live tree basal areas; volume of down logs over 12 inches in diameter; and basal area of hardwood trees over 10 inches in diameter at the root crown.	In protected areas where silvicultural or fire abatement treatments are planned, monitor treated stands pre- and post-treatments to determine changes and trajectories in fuel levels; snag basal areas; live tree basal areas; volume of down logs over 12 inches in diameter; and basal area of hardwood trees over 10 inches in diameter at the root crown.

Appendix B – Project Design and Best Management Practices

The following project design and best management practices are project specific. All laws, policies, regulations, manual direction, Forest Plan standards and guidelines, and the A-S Road Activities Best Management Practices (Engineering/Transportation report) will also be followed along with the following requirements listed below. Additionally contract provisions or clauses that are designed to protect resources will be incorporated to fit on-the ground conditions (i.e. timber sales, stewardship contracts, service contracts, and construction contracts).

Hydrology and Soils

Stream Channels

- Stream channels to be protected will be shown on the project contract maps along with their associated Streamside Management Zones (SMZs), if applicable.
- SMZs shall be designated along intermittent and perennial stream channels and selected ephemeral channels as determined by an FS hydrologist prior to project implementation.
- Stream channels shall be crossed at designated crossings only and shall be pre-approved by the authorized Forest Service (FS) Officer in consultation with a Hydrologist.
- There shall be no skidding longitudinally within stream channels.
- There shall be no decking and machine piling of slash material within stream channels.
- Lead-out ditches or water-bars shall not be constructed in such a manner as to divert runoff into stream channels.
- Unless designated by the authorized FS Officer, debris generated from treatment activities will be removed from stream channels.
- Trees designated for removal shall be felled away the stream channel.
- Trees, in or on the banks of stream courses that are providing bank and stream channel stability shall not be removed. The authorized FS Officer will identify exceptions where restoration or additional thinning is needed for resource concerns.
- The authorized FS Officer will use their authority for skid trail and log landing location to protect stream courses that were not designated on the project contract map.
- Riparian areas and meadows designated for protection will also be delineated on the project area and contract maps. A smaller map of buffers is located in Appendix D. A GIS ArcMap of the buffers (Special_Management_Zones.mxd) can be found in the project record.

Streamside Management Zone (SMZ) Designation

SMZ width is based on the nature of resource values at risk (such as the presence of aquatic ESA species or its potential introduction), special concerns for water quality degradation, erosion hazard, existing vegetative groundcover conditions, stream bank and riparian conditions, natural geologic features, and flow regime. SMZ widths shall be designated using the matrix in Appendix F as a guide:

For SMZs along perennial and intermittent streams;

- Directional falling of trees shall be away from the stream channel.
- Ground skidding, decking of logs and machine piling are permitted only on existing roadbeds that are located within SMZs.
- Road construction and burning of concentrated slash are prohibited within the SMZ.
- Stream channels to be protected within SMZs will be identified on watershed and project area contract maps.
- Stand prescriptions shall include a sketch of the SMZ location and width.
- Ground based harvest operations may be conducted in SMZs if at least 6 inches of snow cover over a minimum of 3 inches of frozen ground are present.
- Harvest operations will be suspended if these conditions are not met due to warm temperatures.

Special or Streamside management zone map is within the project record and in Appendix D and also includes buffers on wetlands and significant karst feature such as sinkholes.

Drainage Bottoms –

The following are recommended BMPs for harvesting activities around ephemeral drainages, *whether designated on a map or not.*

- No skidding will be allowed up or down ephemeral channels or in low points or swales.
- No road construction will be allowed in or immediately adjacent to ephemeral streams except at designated crossings.
- All skid trails crossing drainages will be designated and approved by the authorized FS officer prior to activity, and will be at right angles to stream banks.
- Minimize the number of skid trail and road crossings across these channels.
- Maintain an undisturbed filter strip of vegetation and litter between skid trails/log decks/roads and the channel wide enough to prevent sediment from entering the channel.
- Construct water control features (waterbars, leadout ditches etc.) on these skid trails and roads.
- Minimize the amount of logging debris deposited in ephemeral channels and remove excess debris by hand or end lining with one end suspension except where coarse woody debris is needed for stream health as identified by fisheries or watershed specialists.
- Do not cut trees where the root system is important in maintaining the integrity of the bank, including but not limited to cutbanks and headcuts.
- No log decks will be located within or immediately adjacent to the ephemeral streams or depressions.
- The preferred method for extracting biomass using feller-buncher or grapple skidder equipment near ephemeral drainages (within 75 feet) will be to approach the material to

- be extracted on the contour as much as possible to the ephemeral drainage, cut or grapple biomass, then back equipment out as much as possible. This action will reduce ground disturbance by limiting the turning of equipment in or near the stream channels, and will retain as much of the filtering effect of undisturbed ground cover as possible. Slash can be placed to drive equipment over to reduce rutting and soil disturbance.
- Outslope roads/skid trails to minimize concentration of water/sediment into streams closer than 50 feet to channel.
 - Place water control features so there is adequate filter distance between structure outlets and stream channel (minimum of 50 feet and width can increase as slope steepness increases).

Upland Soil

Wetlands, Springs, Seeps, and Meadows

- Wetlands, springs, seeps, and meadows will be protected from treatment activities and include a 50 ft. limited access buffer that excludes mechanized equipment. Treatments may occur within these areas if specific restoration objectives are identified and approved by the FS Officer.
- Ground based harvest operations may only be conducted within 50 feet of wetlands, springs, and meadows if at least 6 inches of snow cover over a minimum of 3 inches of frozen ground are present.

Limit the Operating Season

- Ground disturbing activities (tractor skidding, decking and machine piling, etc.) shall be limited to dry or solidly frozen soil conditions.

Log Landing Erosion Prevention and Control

- Immediately after use, landings will be scarified to bare mineral soil eliminate compaction.
- Once scarified, log landings are to be reseeded with an erosion control seed mix consisting of certified weed free native species. Slash or chips will be scattered on landings to further retard formation of rills and gullies.
- Slash or impound drainage outlets of landings to prevent direct deposition of sediment to waterways.

Skid Trails

- To minimize soil disturbance by equipment use, trees are to be felled to the lead and the authorized FS officer shall locate skid trails as far apart as possible to reduce the number of skid trails needed to harvest the unit.
- Use existing skid trails where properly located.
- Designate new skid trails throughout the project area to prevent long, straight skid trails from running up and down slopes.
- Skidding or forwarding of logs will be with at least one end of the log suspended above the ground surface.

- Skid trails will be water-barred, scarified and seeded with primarily native species as needed.
- All berms and depressions such as ruts will be filled in or removed, restoring skid trails to the natural grade of the slope to the greatest extent possible.
- Slash generated from the project may be spread in addition to water barring where conditions allow.

Soil Productivity/Coarse Woody Debris

- To maintain or improve soil productivity, manage towards having a minimum of:
 - 5-10 tons/acre of coarse woody debris (the 3" + size class) in pine-oak vegetation types
 - 7-14 tons/acre in pine vegetation types
 - 8-16 tons/acre in mixed conifer types.

Machine Piling of Slash

- Where slash is machine piled, minimize disturbance to existing ground cover, surface soil and rock material and any existing surface organic material (i.e. surface litter and duff and old semi-decomposed branches and logs).
- Rough piling will also reduce impacts from equipment. Rough piling involves piling only large concentrations of slash, leaving areas of low concentration undisturbed.
- Machine pile when soils are dry or solidly frozen.

Prescribed Burning

- For the retention of long term soil productivity, to maintain the sediment filtering capacity of streamside management zones, and to reduce erosion, burning is allowed at low to moderate burn intensities.
- Machine constructed (i.e. dozer) control lines shall not be constructed on slopes greater than 40% or within SMZ's. Exceptions will be identified by the authorized FS Officer and specific mitigations will be determined at that time.

Roads

Maintenance of Roads

- Existing and newly constructed roads are maintained throughout the life of the project to insure that drainage structures (culverts, rock crossings, rolling dips, etc.) are functioning correctly, and that concentrated surface run-off does not occur.
- Drainage control structures will receive maintenance prior to winter shutdown of project operations.

Long Term Road Closures

- Closed roads (ML 1) will be disguised or blocked reseed with an erosion control seed mix of primarily native species and lightly scarified.
- Road berms located lateral to the roadbed will be removed and ruts will be filled in.

- Water-bars of enough size to either remove the water from the road or with enough storage to prevent run-off from returning to the road will be installed.
- All connected disturbed areas (CDA): high runoff areas like roads, skid trails, mines, burns, or highly compacted soils that drain directly into the stream system will be disconnected from stream systems.
- Where necessary, scarify, reseed and camouflage the road entrance with rocks and slash to improve the road closure.
- Wing fence construction may be necessary in some cases to effectively prevent new resource damage from vehicles attempting to drive around closures.

Karst Features

Karst processes - that is, the process by which water dissolving away soluble rock such as limestone - create karst topography, an area typified by sinkholes, underground streams, caves, and springs. Local and regional hydrological systems resulting from karst processes can be directly influenced by surface and sub-surface land use practices. Karst terrain is an important feature of groundwater movement and recharge. Karst terrain will be managed to assure that water quality, spring flow, drainage patterns and caves are not significantly altered.

- Karst features such as prominent sinkholes and entrances to significant caves (as defined by the Federal Cave Resource Protection Act of 1988) have been given site-specific SMZ's and may have limited access buffered zones within the LFRP of up to 75 feet that excludes mechanical entry/treatment.

Terrestrial and Aquatic Wildlife

- Retain two to three live trees greater than 18 inches dbh per acre for snag recruitment. Best trees include live trees with lightning scars and dead tops.
- Outside of landing areas, protect existing snags unless they pose a health or safety risk.

Mexican Spotted Owl (MSO)

- Mexican spotted owl timing restrictions will be applied to management activities within one-quarter mile of Protected Activity Centers in areas where active nest trees have been identified; the buffer will be one-quarter mile from the nest tree. Within these areas, no treatment-related activities would occur from March 1 – August 31.
- Retain all trees >24 inches in diameter in MSO recovery habitat areas.
- Prescribed burning will be allowed in 100-acre MSO PAC core areas only at low severities and intensities outside of the breeding season. Project key habitat elements including large trees, snags, down logs and hardwoods.
- No thinning would occur within the 100-acre core areas of MSO PACs.
- Broadcast burning in MSO recovery and protected habitat would be to reduce duff, woody debris, and smaller diameter trees while retaining tree canopy and vertical structure habitat components. Maintain dense forest canopy where it exists, and retain snags and downed logs.

- Fire-created openings should be minimal and not greater than 4 acres in MSO recovery habitat.

Northern Goshawk (NGO)

- NGO timing restrictions will be applied within PFAs to management activities. Within these areas no treatment will occur March 1 through September 30.

Heritage Resources

- All Larson proposed treatments should be managed as having either “no effect or “no adverse effect” to cultural resources. This means that all sites listed, eligible, or unevaluated for the National Register of Historic Places (NRHP) would be avoided or not adversely affected by proposed activities. Per Appendix J of the programmatic, prior to the authorization of on-the-ground work for each phase of the project, the following must be completed.
 - Inventory (survey), identification (site recording), and NRHP evaluation are documented in a Section 106 compliance inventory report and signed Forest Service inventory standards and accounting (ISA) forms are completed.
 - Site protection requirements shall be documented in the inventory report on the FS ISA form and protection requirements shall be completed.
- Timber and fire project managers will work with a Forest Service Archaeologist to assure there is adequate notification and time to conduct inventory surveys prior to implementation. The entire treatment area will be 100 percent surveyed and the entire area is proposed for mechanical and manual treatments, all phases will result in a “no adverse effect” (unless no cultural resources are present). All reports shall be sent to the SHPO. Protection measures shall be selected from appendix J, section II. Section II includes a list of protection measures that the forests can draw from to ensure that adverse effects to cultural resources are avoided or minimized. These measures include but are not limited to the following:
 - No treatments or ground disturbance within site boundaries
 - Allow treatments within site boundaries provided: cutting is accomplished using hand tools only; large diameter trees are felled away from all features; materials removed from the site are removed by hand; no dragging of logs, trees, or thinned material across or within site boundaries.
 - No use of vehicles or other mechanized equipment within site boundaries.
 - No staging of equipment within site boundaries.
 - No slash piles within site boundaries.
 - The forest archaeologists may approve additional measures to further protect sites.
 - In the case of broadcast burning, only fire sensitive sites will require protection from prescribed fire. Generally sites sensitive to fire effects include, but are not limited to, rock art, prehistoric sites with flammable architectural elements and other flammable features or artifacts, dendroglyphs (aspen art), historic sites with standing or down wooden structures, or other flammable features or combustible artifact materials (such as wood, historic properties) will require protection.
 - For mechanized treatments, all cultural resources (excluding the General Crook Trail) listed, eligible, or unevaluated for the NRHP will be marked for avoidance.

Treatments and associated project activities will comply with the guidelines for the General Crook Trail stated in the Forest Plan.

- For the portion of the Crook Trail within the project area. Use of motorized vehicles on any portion of the trail not specifically designated and designed for motorized vehicle travel is prohibited. Emphasize protection for the historic value of the trail route. Manage a 200-foot wide corridor to preserve evidence of historic roadway and landscape character, including related historic trees, markers, gravesites, and water holes.
- Motorized use of the trail is defined as traveling on the trail by motorized vehicle/equipment. Roads for access and hauling will be used that cross over the non-motorized portion of the trail. This activity is in compliance with the forest plan and will not adversely affect the trail and its associated features. Segments of the trail that are specifically designed for motorized vehicle travel will be used.
- Should additional sites be discovered during project implementation, all work in that locale shall be halted and Forest Service Archaeologist will be notified immediately. Work shall not resume in that area until a Forest Service Archaeologist has notified the District Ranger that work can precede.
- Terms and conditions of Section 106 compliance shall include appropriate post project monitoring requirements as determined necessary by the forest archaeologist to assess the effectiveness of protection measures. All site monitoring shall be documented on a site update form and/or monitoring report as appropriate. Per protocol, the Apache-Sitgreaves NFs shall maintain an updated list of sites to be monitored that are part of the Larson Forest Restoration Project, which will include the date monitoring is completed and the monitoring results.

Recreation

- Hauling, logging, or associated restoration activities on and along NFSR237 and NFSR99 from 1200 (noon) Thursday to 1200 (noon) Monday during Memorial Day and Labor Day weekends, and if July 4 falls on a Friday-Monday during treatment.
- Implement area closures during restoration activities when needed to address public health and safety.

Lands and Special Uses

- Place project-generated slash outside of rights-of-way permitted to APS or SRP to not interfere with APS or SRP utility corridor vegetation management.
- Utility companies should be consulted prior to prescribed burning activities, as smoke affects the charged lines and may cause an unexpected arc.

Transportation

- To maintain health and safety for all users on the roads, hauling operations shall be conducted at speeds prudent for the road conditions and at no time exceed 25 miles per hour (MPH) or posted speed limits.

Range/Noxious Weeds

- Prescribed burning and vegetation treatment areas should be coordinated with livestock grazing. Livestock use may need to be deferred or areas rested, if necessary in order to maintain sufficient fine fuels to carry fire, prior to burning, or to allow reestablishment of new growth after burning.
- Prior to moving any equipment onto the project area, the equipment needs to be cleaned and free of weeds/seeds. The Forest Service will be notified prior to each piece of equipment enters the Project. Movement of equipment within treatment units within the project area can occur without cleaning, unless noxious weeds are found. If noxious weed populations are identified prior to implementation avoid the area until a District weed coordinator can evaluate. Any seeding that occurs on the project shall be certified weed free.

Appendix C – Monitoring Requirements

Soil and Water

- A. Implementation and Effectiveness monitoring of Best Management Practices. Conduct Implementation and Effectiveness Monitoring for Best Management Practices. The Contract Administrators Representative will use the BMP implementation form provided by Watershed Staff to monitoring BMP implementation. These forms will be reviewed annually to verify BMP implementation. Implementation review and selection of effectiveness monitoring sites will be accomplished as a part of either the annual TSO review of Contracting Officers Representative, Sale Administrators or during a District Activity Review. Utilize forms provided for BMP Implementation and Effectiveness Monitoring. See "Best Management Practices Effectiveness Program Procedures" for site selection and detailed monitoring procedures. Results of BMP monitoring will be forwarded to ADEQ in the Annual Assessment of Water Quality Accomplishment Report to be completed by the Supervisor's Office due in September of each year.

The desired result of BMP monitoring is to document forest practices and BMPs that appear effective in reducing sediment and moderating flow regimes in forest streams. BMPs that are found to be ineffective in protecting identified resource, aquatic and water quality goals will be adjusted. Poor performance in BMP implementation will be documented and forwarded to District for corrective action.

- B. Soil Disturbance Monitoring

Conduct Soil Disturbance Monitoring on selected cutting units (Forest sampling strategy is To Be Determined). Soil bulk density information will also be collected and compared to disturbance classes to add to forests' knowledge of the correlation of soil disturbance class and soil condition. Soil Disturbance Classes and sampling protocols are described in "Forest Soil Disturbance Monitoring Protocol" (Page-Dumroese, et.al. 2009). Soil condition classes are described in FSH 2509.18 R3 Supplement.

The desired result of Soil Disturbance Monitoring is to determine if forest practices may be reducing long term soil productivity through modification of soil function through compaction, displacement or loss of soils.

Appendix D – Old Tree Implementation Plan

Desired Conditions for Ponderosa Pine

To maintain or develop a forest condition that is dominated by uneven-aged forest stands. This means that each stand would be managed towards a balance of young, mid-aged, and old forest structure at the fine scale within each stand. This also means that each stand would correspondingly have a balance (by area occupied, not trees per acre) of small, medium and large-sized trees. Also these trees would be grouped in natural spatial patterns that include intermixes of tree groups and forest interspaces

Old Tree Descriptions and Illustrations

Old trees (approximately >150 years old) would be retained, with few exceptions, regardless of their diameter, within the Larson project area. Removal of old trees would be rare. Exceptions would be made for threats to human health and safety. Old trees would not be cut for forest health issues or to balance age or size class distributions.

One example of a situation where the removal of an old tree is necessary in order to prevent additional habitat degradation is in the rare case of an old tree growing on the side of an existing curve in a road. Logging equipment may require a wider turning radius. The options are to relocate the road or cut the old tree and widen the curve to accommodate the larger turning radius. Relocating the road would result in a larger area of the forest being permanently disturbed, versus cutting the large tree and widening the curves radius. This is an example where cutting the old tree would result in less habitat degradation then relocating a road.

Old trees would be determined by the following characteristics described by Thomson (1940) as 3 (intermediate-mature) and 4 (mature to over-mature).

- Age – Approximately 150 years and older.
- D.b.h. – Site dependent.
- Bark – ranging from reddish brown, shading to black in the top with moderately large plates between the fissures to reddish brown to yellow, with very wide, long, and smooth plates.
- Tops – ranging from pyramidal or rounded (occasionally pointed) to flat (making no further height growth).
- Branching – ranging from upturned in upper third of the crown, horizontal in the middle third, and drooping in the lower third of the crown to mostly large, drooping, gnarled, or crooked. Branch whorls range from incomplete and indistinct except at the top to completely indistinct and incomplete.

Figure 4 and Figure 5 display illustrations of size class 3 (intermediate-mature) and size class 4 (mature-overmature) from Thomson 1940.

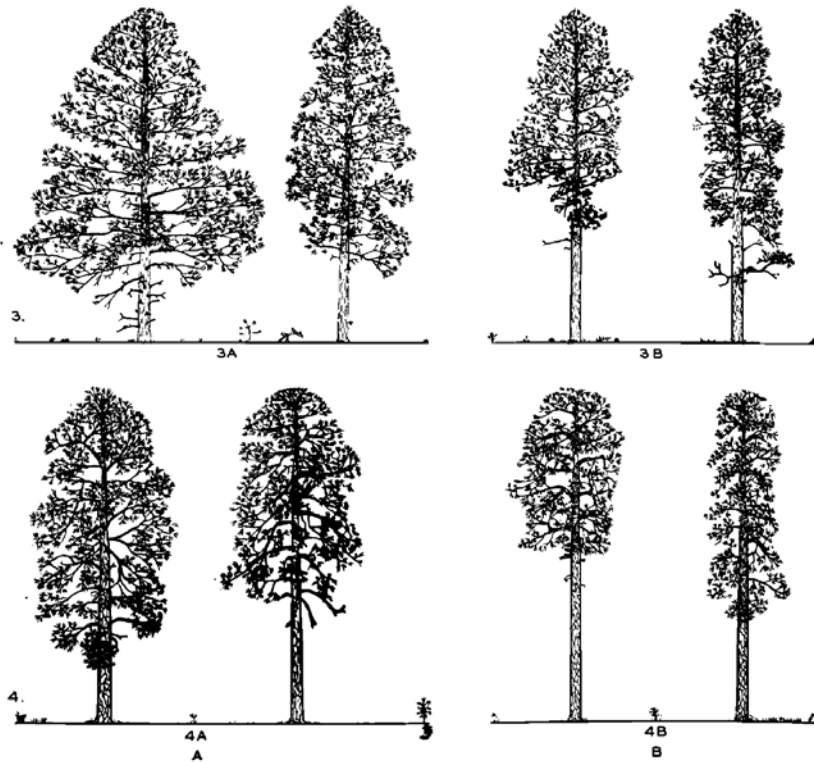


Figure 4. Old tree characteristics (Thomson 1940)

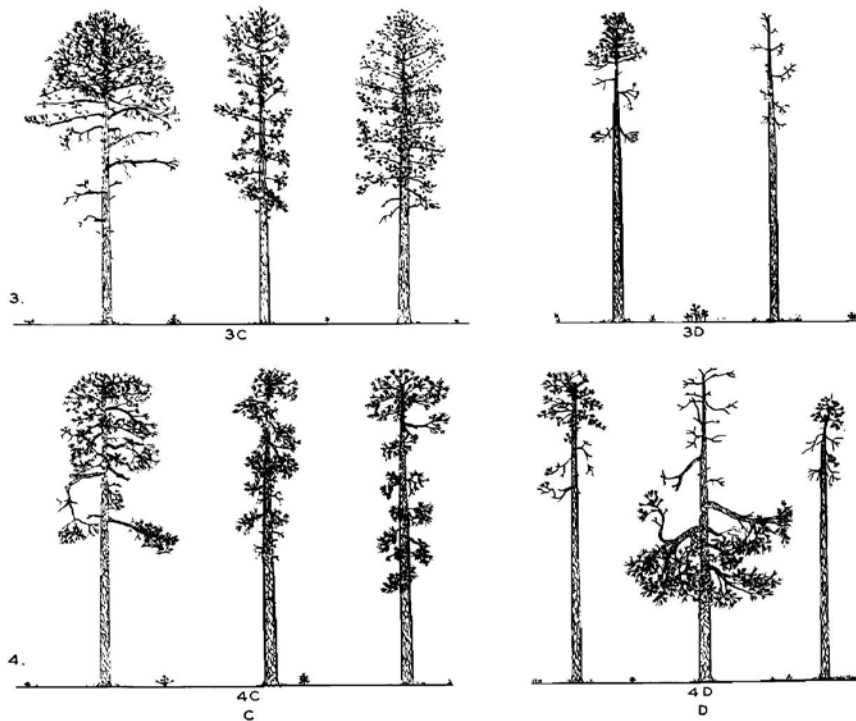


Figure 5. Old age tree characteristics continued (Thomson 1940)

Larson Large Tree Implementation Plan

Introduction

The large tree implementation plan is specific to the Larson Decision. It is designed to reflect CFLRA requirements regarding large tree retention by clarifying the intent to focus restoration treatments on small-diameter tree thinning, to retain large trees whenever possible, and to more specifically design treatments so that large trees would be retained unless they must be cut to meet the desired conditions listed in the categories below. It responds to comments received during scoping (August 2011). The plan's desired conditions are consistent with the summarized desired conditions found in the project's purpose and need and the plan provides additional citations that support the desired conditions. It incorporates the old tree implementation plan by reference.

For the purpose of this document, large/post-settlement trees, as defined by the socio-political process, are those that are 16-inch d.b.h. or larger. Trees greater than or equal to 18-inch d.b.h. represent VSS 5 and 6. VSS 5 and 6 represent the largest and (sometimes) oldest trees. These size classes best correspond with the successional age classification system that was developed to address the forest dynamics of southwestern ponderosa pine. Additionally these size classes were developed to best describe regeneration growth and development of forests in the Southwest for goshawk management (Reynolds et al. 1992).

The plan may not include every instance where large post-settlement trees may be cut. There may be additional areas and/or circumstances where large post-settlement trees need to be removed in order to achieve restoration objectives. During implementation (prescription development), if a condition exists that does not meet the desired conditions included in this strategy, no large trees would be cut until the NEPA decision is reviewed by the Forest Service implementation team. The team would decide whether the action is consistent with the analysis and the decision made. This information would be made part of the annual implementation plan checklist/compliance review that is recommended by the team and approved by the forest supervisor.

Seeps and Springs

Seeps are locations where surface-emergent groundwater causes ephemeral or perennial moist soil or bedrock. Standing or running water is infrequent or absent. Vegetation and other biological diversity are adapted to mesic soils. Springs are small areas where surface-emergent groundwater causes ephemeral or perennial standing or running water and wet or moist soils. Vegetation and other biological diversity are adapted to mesic soils or aquatic environments (Feth and Hem 1963).

Seeps and springs exhibit unique, often isolated biophysical conditions that can sustain unique, mesic-adapted biological diversity, and can facilitate endemism and speciation. Springs also provide water and other habitat to terrestrial wildlife. Due to the absence of frequent fires in the presence of livestock grazing, the establishment of large post-settlement trees may reduce available soil moisture (Simonin et al. 2007) and block the sunlight necessary to support the unique biophysical conditions associated with seeps and springs.

Removal of trees that have encroached upon seeps and springs may constitute a relatively small part of an overall seep and spring restoration effort, when compared to fully addressing root causes of overall degradation. Thinning alone, without addressing other sources of degradation, is unlikely to fully restore seeps and springs (Thompson et al. 2002). However, it is a necessary step leading to the restoration of these ecologically important areas.

Desired Conditions

- The biophysical conditions in seeps and springs upon which terrestrial, mesic-adapted, and aquatic native biological diversity depend are conserved and restored.
- The integrity of the spring's unique biophysical attributes is not compromised by tree shading.
- Mesic soils associated with a seep or spring are not encroached upon by conifers.
- If treatment occurs, an equivalent number of large replacement trees remain where there is evidence that pre-settlement trees have grown in similar root and crown proximity to a particular seep or spring in the past.

Riparian

Riparian areas occur along ephemeral or perennial streams or are located downgradient of seeps or springs. These areas exhibit riparian vegetation, mesic soils, and/or aquatic environments. Riparian areas exhibit unique biophysical conditions that can sustain unique, mesic-adapted, or aquatic biological diversity. Riparian areas and the streams, springs, and seeps connected to them often harbor imperiled species that can be sources of endemism. Riparian areas also provide water and other habitat to terrestrial wildlife. In the absence of frequent fires and in the presence of other competing factors, large post-settlement trees may have become established and grown within riparian areas to the point that they compromise available soil moisture or light that support the unique biophysical conditions that are associated with the riparian areas. However, it is likely to be a very rare circumstance that conifer trees of any size would need to be removed from forested riparian zones.

Desired Conditions

- The biophysical conditions in riparian habitat upon which terrestrial and aquatic native biological diversity depends are conserved and restored.
- The use of soil and water best management practices (BMPs) minimize the impacts of cutting trees within riparian areas.
- Removal of trees constitutes a relatively small part of an overall riparian area restoration effort, when compared to the fundamental causes of overall degradation. Riparian areas are fully restored by using an array of tools that address all sources of degradation.
- Available soil moisture or light that support that area's unique biophysical conditions is not compromised by growing (rooted) trees.
- If treatment occurs, an equivalent number of large replacement trees remain where there is evidence that pre-settlement trees have grown in similar root and crown proximity to a particular seep or spring in the past.
- Post-treatment snags and logs that include large trees are available onsite.

Wet Meadows

High elevation streamside or spring-fed meadows occur in numerous locations throughout the Southwest. However, less than 1 percent of the landscape in the region is characterized as wetland (Dahl 1990), and wet meadows are just one of several wetland types that occur. Patton and Judd (1970) reported that approximately 17,700 hectares of wet meadows occur on national forests in Arizona and New Mexico.

Wet meadows may be referred to as riparian meadows, montane (or high elevation) riparian meadows, sedge meadows, or simply as wet meadows. Wet meadows are usually located in valleys or swales, but may occasionally be found in isolated depressions, such as along the fringes of ponds and lakes with no outlets. Where wet meadows have not been excessively altered, sedges (*Carex* spp.), rushes (*Juncus* spp.), and spikerush (*Eleocharis* spp.) are common species (Patton and Judd 1970, Hendrickson and Minckley 1984, Muldavin et al. 2000). Willow (*Salix*) and alder (*Alnus*) species often occur in or adjacent to these meadows (Long 2000, Long 2002, Maschinski 2001, Medina and Steed 2002). High elevation wet meadows frequently occur along a gradient that includes aquatic vegetation at the lower end and mesic meadows, dry meadows, and ponderosa pine or mixed conifer forest at the upper end. These vegetation gradients are closely associated with differences in flooding, depth to water table, and soil characteristics (Judd 1972, Castelli et al. 2000, Dwire et al. 2006). While relatively rare, wet meadows are believed to be of disproportionate value because of their use by wildlife and the range of other ecosystem services they provide. Wet meadows perform many of the same ecosystem functions associated with other wetland types, such as water quality improvement, reduction of flood peaks, and carbon sequestration.

Wet meadows are one of the most heavily altered ecosystems. They have been used extensively for grazing livestock, have become the site of many small dams and stock tanks, have had roads built through them, and have experienced other types of hydrologic alterations. Most notably, the lowering of their water tables due to stream downcutting, surface water diversions, or groundwater withdrawal (Neary and Medina 1996) has occurred. In the presence of livestock grazing and hydrologic changes, large post-settlement trees may have established and grown within wet meadows such that they compromise available soil moisture or light creating unique biophysical conditions.

Desired Conditions

- The biophysical conditions of wet meadows upon which terrestrial native biological diversity depend are conserved and restored.
- Wet meadow function is not impaired by growing (rooted) trees.
- If treatment occurs, an equivalent number of large replacement trees remain where there is evidence that pre-settlement trees have grown in similar root and crown proximity to a particular seep or spring in the past.
- Removal of large trees constitutes a relatively small part of an overall riparian area restoration effort, when compared to the fundamental causes of overall degradation. Wet meadows are fully restored by using an array of tools that address all sources of degradation.

Encroached Grasslands

Encroached grasslands are herbaceous ecosystems that have infrequent to no evidence of pine trees growing prior to settlement. The two prevalent grassland categories in the Larson project area are montane (includes subalpine) grasslands and Colorado Plateau (a subset of Great Basin) grasslands, with montane grasslands being most common (Finch 2004). A key indicator of grasslands is the presence of mollisol soils. Mollisol soils are typically deeper with higher rates of accumulation and decomposition of soil organic matter relative to soils in the surrounding landscape. Grasslands in this region are the dark, rich soils observed in association with mollic soils, maintained by a combination of climate, fire, wind desiccation and, to a lesser extent, by animal herbivory (Finch 2004).

Typical montane grasslands in this region are characterized by Arizona fescue (*Festuca arizonica*) meadows on elevated plains of basaltic and sandstone residual soils. Montane grasslands generally occur in small (<100 acres) to medium sized (100 to 1,000 acres) patches. Historic maintenance of the herbaceous condition in these grasslands is subject to some debate though appears to be primarily driven by periodic fire. The cool-season growth of Arizona fescue also plays a large role in maintenance of parks and openings by directly competing with ponderosa pine seedlings. Identification of grasslands in this region should use a combination of the TES, Southwest Regional GAP Analysis, and Brown and Lowe Vegetation Classification (Brown and Lowe 1982, TNC GIS Layer 2006) among other existing vegetation and soils data.

Prior to European settlement, pine trees were rarely established in grasslands because they were either outcompeted by production of cool-season grasses or killed by frequent fire (Finch 2004). In the late 1800s, unsustainable livestock grazing practices significantly reduced herbaceous cover, reducing competition pressure on pine seedlings. Coupled with the onset of fire suppression in the early 1900s, pine trees rapidly encroached and recruited into native grasslands (e.g., Moore and Huffman 2004, Coop and Givnish 2007). Plant diversity is particularly important in grassland ecosystems. Grassland plots with greater species diversity have been found to be more resistant to drought and to recover more quickly than less diverse plots (Tilman and Downing 1994). This resilience will become even more important in a warming climate. Pine tree removal, restoration of fire, and complementary reductions in livestock grazing pressure are all necessary to restore structure and function of native grasslands.

Desired Conditions

- Grasslands are enhanced, maintained, and function with potential natural vegetation (as defined by vegetative mapping units).
- Grasslands function with a natural fire regime.
- Existing grasslands are not encroached upon by conifers.
- If treatment occurs, an equivalent number of large replacement trees remain where there is evidence that pre-settlement trees have grown in similar root and crown proximity to a particular seep or spring in the past.

Aspen Forest and Woodland

Quaking aspen (*Populus tremuloides*) occurs in small patches throughout the Larson project area. Bartos (2001) refers to three broad categories of aspen: (1) stable and regenerating (stable), (2)

converting to conifers (seral), and (3) decadent and deteriorating. Almost all of the aspen occurring within ponderosa pine forests of the Larson project area is seral aspen, which regenerates after disturbance through root sprouting and rarely from seed production (Quinn and Wu 2001). Favorable soil and moisture conditions maintain stable aspen over time. Aspen stands have been mapped across the entire Larson area and map layers are available from existing databases.

Aspen occurs within ponderosa pine forests. It is ecologically important due to the high concentration of biodiversity that depends on aspen for habitat (Tew 1970, DeByle 1985, Finch and Reynolds 1987, Griffis-Kyle and Beier 2003). In addition, stable aspen stands serve as an indicator of ecological integrity (Di Orio et al. 2005). Aspen is currently declining at an alarming rate (Fairweather et al. 2008).

The lack of fire as a natural disturbance regime in southwestern ponderosa pine forests since European settlement has caused much of the aspen dominated lands to cede to conifers (Bartos 2001). Other factors contributing to gradual aspen decline over the past 140 years include reduced regeneration from browsing ungulates (Pearson 1914, Larson 1959, Martin 1965, Jones 1975, Shepperd and Fairweather 1994, Martin 2007). More recently, aerial and ground surveys indicate more rapid decline of aspen, with very high mortality occurring in low and mid-elevation aspen sites. Major factors thought to be causing this rapid decline of aspen include frost events, severe drought, and a host of insects and pathogens (Fairweather et al. 2008) that have served as the “final straws” for already compromised stands.

Desired Conditions

- Aspen forests and woodlands are conserved and restored to their appropriate fire regime.
- Aspen is effectively being regenerated or maintained, and regeneration, saplings, and juvenile trees are protected from browsing.
- There is decreased competition from ponderosa pine. Post-settlement ponderosa pine tree numbers do not exceed residual targets that have been identified using pre-settlement conifer tree evidences, site visitations, and collected data.
- Removal of large trees constitutes a relatively small part of the aspen restoration effort, when compared to the fundamental causes of overall degradation. Aspen forests and woodlands are fully restored by using an array of tools that address all sources of degradation.

Ponderosa Pine/Gambel Oak Forest (Pine-Oak)

A number of habitat types exist in the southwestern United States that could be described as pine-oak. Ponderosa pine forests are interspersed with Gambel oak trees in locations throughout the Larson area in a habitat association referred to as PIPO/QUGA (USFS 1997, USDI 1995). In southwestern ponderosa pine forests, Gambel oak has several growth forms distinguished by stem sizes and the density and spacing of stems within clumps. These include shrubby thickets of small stems, clumps of intermediate-sized stems, and large, mature trees that are influenced by age, disturbance history, and site conditions (Kruse 1992, Rosenstock 1998, Abella and Springer 2008, Abella 2008a). Different growth forms provide important habitat for a large number and variety of wildlife species (Neff et al. 1979, Kruse 1992). These include hiding cover in a landscape with limited woody shrub cover, cavity substrate for birds and bats, roost potential for bats, nest sites for birds, and bark characteristics used by invertebrates. Whether as saplings,

shrubby thickets, or larger sized trees, oak adds a high value for wildlife in ponderosa pine forests.

Gambel oak provides high quality wildlife habitat in its various growth forms and is a desirable component of ponderosa pine forests (Neff et al. 1979, Kruse 1992, Bernardos et al. 2004). Gambel oak enhances soils (Klemmedson 1987), wildlife habitat (Kruse 1992, Rosenstock 1998, USDI 1995, Bernardos et al. 2004), and understory community composition (Abella and Springer 2008). Large oak trees are particularly valuable since they typically provide more natural cavities and pockets of decay that allow excavation and use by cavity nesters than conifers. In addition to its important ecological role,

Gambel oak has high value to humans as it is a popular firewood that possesses superior heat-producing qualities compared to other tree species (Wagstaff 1984).

Although management on public lands with regard to oak has changed to better protect the species, illegal firewood cutting of Gambel oak, and elk and livestock grazing negatively impact oak growth and regeneration (Harper et al. 1985, Clary and Tiedemann 1992). Illegal firewood cutting of Gambel oak continues to result in the removal of rare, large diameter oak trees (Bernardos et al. 2004).

Chambers (2002) found that Gambel oak on the Apache-Sitgreaves NFs was distributed in an uneven-aged distribution, dominated by smaller size classes (<5 centimeter d.b.h.) and few large diameter oak trees. Because of Gambel oak's slow growth rate, there may be little opportunity for these small Gambel oak trees to attain large diameters (>85 centimeters) (Chambers 2002).

Pine competition with oak has been identified as an issue in slowing oak growth, particularly for older oaks (Onkonburi 1999). Onkonburi (1999) also found that for northern Arizona forests, pine thinning increased oak incremental growth more than oak thinning and prescribed fire. Fulé (2005) found that oak diameter growth tended to be greater in areas where pine was thinned relative to burn only treatments and controls. Thinning of competing pine trees may promote large oaks with vigorous crowns and enhanced acorn production (Abella 2008b), and may increase oak seedling establishment (Ffolliott and Gottfried 1991).

Desired Conditions

All Gambel Oak

- Small oak trees develop into larger size classes.
- Fire treatments retain small and shrubby oak in numbers and distribution.
- All growth forms of Gambel oak are present and larger, older oak trees are enhanced and maintained.
- Large, post-settlement trees are not restricting oak development.
- Frequent, low intensity surface fire occurs in ponderosa pine-Gambel oak forests.
- Brushy thicket, pole, and dispersed clump growth forms of Gambel oak are present and maintained by allowing natural self-thinning, thinning dense clumps, and/or burning.
- Gambel oak growth forms are protected from damage during restoration treatments including thinning and post-thinning slash burning.
- Stands with a preponderance of large trees (at a minimum all VSS 5 and 6 stands and VSS 4 stands with a mean BA greater than 70 and a mean TPA less than 100) would be managed for greater residual canopy cover and density of large trees. Residual stand structure would be managed at the upper end of natural range of variability for

ponderosa pine stands that meet these conditions. This would be accomplished by focusing treatments towards the lower end of the identified intensity range, managing for larger group sizes, and/or retaining additional large trees.

In MSO Recovery Habitat

- Within MSO habitat and designated critical habitat, the recovery plan for the MSO improves key habitat components and primary biological factors, which includes Gambel oak.
- Within one chain (66 feet) of oak 10- inch d.r.c. or larger, post-settlement mixed conifer trees (that do not have interlocking crowns with oak) are not restricting oak development.

Outside MSO Recovery Habitat

- Large post-settlement trees do not overlap with those of Gambel oak trees exhibiting >8 inch d.r.c. within a chain of Gambel oak.

Within-stand Openings

Within-stand openings are small openings (generally 0.05 to 1.0 acres) that were occupied by grasses and wildflowers before settlement (Pearson 1942, White 1985, Covington and Sackett 1992, Sánchez Meador et al. 2009). For the purposes of this strategy, within-stand openings are equivalent to interspaces. The within-stand opening management approach described below is distinct from, and should not be considered as guidance relating to regeneration openings.

Pre-settlement openings can be identified by the lack of stumps, stump holes, and other evidence of pre-settlement tree occupancy (Covington et al. 1997). These openings are most pronounced on sites with heavy textured (e.g., silt-clay loam) soils (Covington and Moore 1994). Current openings include fine-scaled canopy gaps. It is not necessary to have desired within-stand openings and groups located in the same location that they were in before settlement (the site fidelity assumption). Trees might be retained in areas that were openings before settlement, and openings might be established in areas which had previously supported pre-settlement trees. Within-stand openings appear to have been self-perpetuating before overgrazing and fire exclusion (Pearson 1942, Sánchez Meador et al. 2009). Fully occupied by the roots of grasses and wildflowers as well as those of neighboring groups of trees, these openings had low water and nutrient availability because of intense root competition (Kaye et al. 1999). Heavy surface fuel loads insured that tree seedlings were killed by frequent surface fires, reinforcing the competitive exclusion of tree seedlings (Fulé et al. 1997).

These natural openings appear to have been very important for some species of butterflies, birds, and mammals (Waltz and Covington 2004). Often the largest post-settlement trees, typically a single tree, became established in these natural within-stand openings as soon as herbaceous vegetation was removed by overgrazing (Sánchez Meador et al. 2009). Contemporary within-stand openings or areas dominated by smaller post-settlement trees should be the starting point for restoring more natural within-stand heterogeneity.

Desired Conditions

- The pattern of openings within stands that provide natural spatial heterogeneity for biological diversity are conserved.

- Openings break up fuel continuity to reduce the probability of torching and crowning and restore natural heterogeneity within stands.
- Openings promote snowpack accumulation and retention which benefits groundwater recharge and watershed processes at the fine (1 to 10 acres) scale.
- The presence of such trees does not prevent the reestablishment of sufficient within-stand openings to emulate natural vegetation patterns based on current stand conditions, pre-settlement evidences, desired future conditions, or other restoration objectives.
- Groups of trees typically range in size from 0.1 acre to 1 acre. Canopy gaps and interspaces between tree groups or individuals are based on site productivity and soil type.
- Suitable openings for successful natural regeneration in this project would range in size from 4 acres to 1/10th acre in ponderosa pine and mixed conifer stands. Openings would be created by focusing on removal of VSS 3 and lower VSS 4, given the excess of such trees across the project area.
- Stands with a preponderance of large trees (at a minimum all VSS 5 and 6 stands and VSS 4 stands with a mean BA greater than 70 and a mean TPA less than 100) would be managed for greater residual canopy cover and density of large trees. Residual stand structure would be managed at the upper end of natural range of variability for ponderosa pine stands that meet these conditions. This would be accomplished by focusing treatments towards the lower end of the identified intensity range, managing for larger group sizes, and/or retaining additional large trees.

Heavily-Stocked Stands (with High Basal Area) Generated by a Preponderance of Large, Young Trees

In some areas, the increase in post-settlement trees has been so rapid that current stand structure is characterized by high density and high basal area in large, young ponderosa pine trees. These stands or groups of stands exhibit continuous canopy which promotes unnaturally severe fire effects under severe fire weather conditions. At the fine scale, the management approach would apply on a case-by-case basis. The cutting of large trees may be necessary to meet site-specific ecological objectives as listed below. For example, the cutting of large trees may be necessary in order to reduce the potential for crown fire to spread into communities or important habitats that include MSO and/or goshawk nest stands. This approach would apply when other options would not alleviate severe fire effects.

In stands where pre-settlement evidences, restoration objectives, community protection, or other ecological restoration objectives indicate much lower tree density and basal area would be desirable, large post-settlement pines may need to be removed to achieve post-treatment conditions consistent with a desired restoration trajectory. Where evidence indicates higher tree density and basal area would have occurred pre-settlement, only a few large pines may need to be removed. Many of these areas would support crown fire and, thus, require structural modification to reduce crown fire potential and restore understory vegetation that supports surface fire.

Desired Conditions

- Natural heterogeneity of forest, savanna, and grasslands occurs at the landscape scale and within stands.
- Groups are restored by retaining the largest trees on the landscape to reestablish old growth structure in the shortest timeframe possible.

- Decreased shading and interception from the canopy, decreased needle litter and duff, and surface fire restore and maintain a mosaic of natural vegetative communities.
- Decreased shading and interception from the canopy fuels allow the growth of continuous herbaceous surface fuels to carry surface fire.
- Reduced horizontal and vertical canopy fuels reduce the potential for crown fire.
- Regeneration openings that contribute to the ecological objective of natural heterogeneity of historical forest structure and age class diversity are not encroached upon by trees.
- Stands with a preponderance of large trees (at a minimum all VSS 5 and 6 stands and VSS 4 stands with a mean BA greater than 70 and a mean TPA less than 100) would be managed for greater residual canopy cover and density of large trees. Residual stand structure would be managed at the upper end of natural range of variability for ponderosa pine stands that meet these conditions. This would be accomplished by focusing treatments towards the lower end of the identified intensity range, managing for larger group sizes, and/or retaining additional large trees.

Dwarf Mistletoe

Dwarf mistletoe is a naturally occurring parasitic plant in Southwest ponderosa pine forests. In the Larson project area, dwarf mistletoe occurs in ponderosa pine stands, and at the highest frequency in those areas proposed for shelterwood/seed cut with reserves in alternative 2. Retention of dwarf mistletoe is a problem in the upper canopies as this parasite will spread to regeneration and continue to amalgamate this parasite, creating unhealthy stand conditions.

In some areas, dwarf mistletoe infestation is so severe, trees are unable to regenerate. This additionally causes an increased fire hazard due to extensive needles on live trees. At the fine scale, the management approach would apply on a case-by-case basis. The cutting/and or mortality (see differences between alternative 2 and 3-modified) of large trees may be necessary to meet site-specific ecological objectives as listed below. For example, the cutting of large trees may be necessary in order to create a mistletoe free or more endemic regeneration of trees.

Desired Conditions

- Endemic existence of dwarf mistletoe in the project area
- Regeneration able to establish without threat of infestation of dwarf mistletoe from upper canopy trees.

Appendix E – Content Analysis

**CONTENT ANALYSIS
LARSON FOREST RESTORATION PROJECT
BLACK MESA RANGER DISTRICT, APACHE-SITGREAVES NATIONAL FOREST**

Consideration of public comments received during the comment period of August 26, 2014 to September 25, 2014. A total of four comment letters were received. Additionally, objection issues brought forward in the first EA and Draft Decision Notice are responded to herein.

Index of Letters

Letter No.	Author	Organization
1	Artley, Dick	
2	Dorum, David	Arizona Game and Fish Department
3	Kell, Patrick	International Mountain Bike Association
4	Lininger, Jay	Center for Biological Diversity
Objection	Lininger, Jay	Center for Biological Diversity

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
Dick Artley		
1	Supervisor Zornes, recent statistically significant nationwide surveys/polls indicate between 64% and 73% of Americans (depending on where they live) don't want their national forests logged). When the people who use the forest only for recreation (who make up the vast majority of forest users) were sampled the percentage opposing logging jumped to 87%. You have examined the <i>Opposing Views Attachments #1, and #21</i> containing quotes from science literature written by over 190 Ph.D. biological scientists explaining how logging/road construction significantly damages scores of natural resources in and downstream from the sale area. You reject their research conclusions which represent best science and instead follow the advice of several timber employees on the forest who are financially motivated to advertise timber sales. Even lay members of the public easily recognize this bias towards timber removal is inconsistent with how they expect USFS employees to behave.	The Larson Forest Restoration project responds to the purpose and need to restore the forest and ecosystem components to a healthier and more productive structure and function. During the scoping process and draft EA comment process, the Forest Service has received supportive comments for proposed actions from Arizona Game and Fish Department, the Eastern Arizona Counties Organization, Navajo county, Gila county, the Salt River project, local recreation groups. As for the use of logging, the Larson project proposes mechanical timber harvest as a means to meet restoration objectives. Volume of wood is a benefit of the project as it helps support local communities, however it is not the purpose of this project. Additionally, the majority of the volume harvested in this project would be biomass (for a local power plant), post and pole material, wood pellets, chips, firewood, and other small diameter material. This material would be from trees less than 16" in diameter, with majority of the material from three to 12" in diameter.
2	Supervisor Zornes, you work for 318 million Americans. Their tax dollars pay your salary. In private industry, what would happen to employees who ignored their supervisor and did precisely what their supervisors told them not to do?	See response to comment #1.
3	Even the USFS acknowledges that the public does not want their public lands logged.	See response to comment #1.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
4	There is no “timber famine” as the USFS has been so fond of predicting for many decades. There is no shortage of raw materials for paper and wood products in the United States. Therefore, there is no reason to have commercial timber sales in the national forests. The USFS could stop logging today and the market would never react, however there is a cause – effect relationship. Future generations of children will have the opportunity to explore and enjoy non-Wilderness national forest land that is truly wild ... land that has not been manipulated and damaged to provide short-term corporate profit opportunities. Indeed, humans cannot improve upon Mother Nature.	See Response to Comment #1
5	Members of the public who submit comments on a draft NEPA document make the effort to read the NEPA document closely and take the time to compose comments that reflect their issues. Supervisor Zornes, unless you respond to these comments and allow the public to read your responses they don’t know if their comments were read and “considered.”	Thank you for your interest in this project and your comments. The response to your comments as identified in your comment letter as well as all comments from all parties is included within this Environmental Assessment.
6	Supervisor Zornes, you accepted and acted on the recommendations to log 40 square miles owned by 318 million Americans provided to you by Mr. Richardson and Mr. Maurer. Their tragic advice was supported by the members of the IDT. Mr. Richardson is financially motivated to push this timber sale. Here’s a rhetorical question. Supervisor Zornes, what drives you to accept the advice of one individual motivated by money when the research conclusions of hundreds of Ph.D. scientists show he’s wrong?	See Response to Comment #1

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
7	Supervisor Zornes, you know inflicting resource damage with commercial logging (a.k.a. euphemistically called mechanical treatment by the USFS) does not “restore” the countless natural resources that exist in a fully functioning forest. You do not tell the public how you determined the past forest condition you are trying to recreate with logging.	Environmental effects from the proposed action and alternatives are summarized in the Environmental Assessment and have been analyzed in further detail within resource specialist reports, and have been available for review since issuance of the Draft Environmental Assessment. To determine past forest conditions, a rapid assessment (conducted by the Ecological Restoration Institute in the summer of 2013) found historical evidence of 30 to 40 trees per acre. Current stand conditions were found to contain from 250 to more than 2,500 trees per acre, with all diameter classes represented through multiple age cohorts. This means there are 10-80 times more trees than was present in the historic, frequent-fire regime period.
8	Supervisor Zornes, on November 6, 2001 USDA Assistant Inspector General for Audit Richard D. Long mailed the "Western Region Audit Report: Forest Service National Fire Plan Implementation" to Chief Bosworth. The report stated: "We concluded that commercial timber sales do not meet the criteria for forest restoration."	See Response to Comment #1.
9	Supervisor Zornes, if you still believe logging restores, improves and creates a healthier forested ecosystem, please see Opposing Views Attachment #21. You can be sure your agency takes extraordinary measures to assure these science papers authored by Dr. Platt, Dr. Thomas, Dr. Veblen, Dr. Ingalsbee, Dr. Peters, Dr. Roberson, Dr. Power, and Dr.Partridge are never read by USFS employees. Do you believe these 8 well-respected scientists are radical environmentalists? Why then do you reject their research conclusions?	See Response to Comment #1.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
10	Supervisor Zornes, the Forest Plan is a contract with the public. NFMA contains a process to amend the forest plan for individual projects to maintain ecological integrity of the area if conditions had changed since the forest plan went into effect. Amending the Forest Plan to allow resource damage to occur in order to make it possible for you to implement a commodity output project with no ecological benefits is unacceptable to the vast majority of Americans. I suggest you read NFMA from beginning to end.	The amendments to the Forest Plan are based on the need to meet the purpose and need for the project while providing management direction and guidance from the Forest Plan specifically in regard to forest interspaces, canopy cover, and Mexican Spotted Owl recovery plan. See pages 17 and 18 for further explanation of Forest Plan amendments.
11	We both know USFS decision-makers (and their supervisors) abhor bad press. We both know the Apache-Sitgreaves National Forest is owned by 314 million Americans.	Comment noted.
12	Supervisor Zornes, you say it's OK to log 499 acres within ¼ mile of the Chevelon Creek Wild and Scenic River because the "upland vegetation above the rim which does not contribute to the wild or scenic character of the river." This is an unsubstantiated statement. A responsible line-officer would present surveys completed by W&S river visitors to verify the false statement. Any logging that might be seen and/or heard by W&S river visitors who hike, float and/or hike near the river violates the Act.	Based on ground truthing with recreation specialists, the character of the Chevelon Creek Wild and Scenic River (CCWSR) is below the rim. Some portions of the established boundary of the CCWSR were drawn above the rim since they are within 1/4 – mile of the stream, which do not present riparian vegetation nor recreational value to the CCWSR.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
2). David Dorum, Arizona Game and Fish Department		
13	Mechanical Treatments - The Department supports the implementation of mechanical treatments to move overly-dense forests toward conditions that result in a more sustainable and healthy forested landscape, and enhanced vegetative structural conditions that provide for the full complement of native wildlife species found within the Project area. Retention of large and pre-settlement trees is an essential component of a forest restoration project, especially in areas deficit in large trees, and the removal of such trees should be avoided except where human safety is at risk or where their removal is necessary to avoid further habitat degradation.	Thank you for your comment in helping meet restoration objectives with Mechanical Treatments. As part of the design of the project restoration objectives include the protection and enhancement of native wildlife species. Retention of large and pre-settlement trees is part of restoring fire adapted ecosystems and has been brought forward in the Larson project. Removal of large trees would be based on the Large Tree Retention Strategy, or for public health and safety to maintain these key components in the project area.
14	Meadow, Riparian, and Aspen Enhancement - The Department strongly supports the actions described in the Proposed Action to restore and enhance meadows, riparian areas, and aspen. This includes the removal of all post-settlement trees from within these areas. The Proposed Action calls for the retention of three existing and potential snags around meadows for wildlife. Given the importance of snags to wildlife, this should be considered a minimum number.	Meadow, riparian, and aspen enhancement is just as integral to restoration as all other restoration activities. In order for ecosystems to have better structure and function, these activities are very important. The removal of post settlement trees in these areas would be on a case-by-case basis dependent on the feasibility and resource protection needs. Snags are also an important feature to wildlife habitat and ecosystem structure and function. These would generally be left except to meet restoration objectives or to provide for public health and safety.
15	Treatment in Mexican Spotted Owl PACs - The Department has been alarmed at the loss of Mexican spotted owl PACs due to recent large fires, and believes that treatment within PACs is necessary to reduce fire hazard to these important areas. As such, the Department welcomes the inclusion in the Proposed Action of fuel reduction treatments within Mexican spotted owl PACs.	Both the Wallow and Rodeo-Chediski fires removed Mexican Spotted Owl PACs. It has been recognized that in order to protect these PACs, treatments must occur outside and within PACs. Treatments brought forward in the Larson project within MSO PACs are not only for hazardous fuels reduction, but also for protection of MSO habitat.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
16	Treatment in NOGO PFAs and Foraging Areas - Most of the proposed fuels reduction activities (25,627 acres) will occur within Northern Goshawk foraging and post-fledgling family areas. The Proposed Action states that tree group size would be maintained by VSS class. In implementing treatment, the Forest should strive to retain and promote structural heterogeneity within these tree groups.	As a majority of the project is Northern Goshawk PFAs or foraging areas. Activities to meet restoration objectives are brought forward to meet a range of structural stages across the project area.
16	Prescribed Burning - The Department strongly supports the use of fire as a treatment component for restoration of fire-adapted landscapes. Although mechanical thinning is often necessary to safely reduce tree densities, without the appropriate application of fire, the benefits to understory vegetation may not be fully realized. The Department therefore commends the Forest for including prescribed fire, including maintenance burns, as a treatment component in the Proposed Action.	As fire is part of fire-adapted ecosystems, prescribed fire is very important in restoring fire-adapted ecosystems.
17	Watershed Restoration Activities - The Department supports watershed restoration activities that restore water quality and watershed function, while maintaining a transportation system that provides public and administrative access, and maintains the Department's ability to meet the Arizona Game and Fish Commission's strategic objectives for wildlife management and management of recreational activities under the Commission's jurisdiction. The Department has reviewed the closed roads proposed for decommissioning, and the unauthorized motorized trails to be obliterated and returned to their natural state, and believes that the resulting road network will meet these stated needs.	Restoring watershed and soils is part of the overall restoration of ecosystems which fits well into the Larson project. The majority of these activities are tied to the improvement of roads and the obliteration of user-created roads which have been creating sediment and runoff problems due to their location.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
3). Patrick Kell, International Mountain Bike Association		
18	Whereas many of these roads and trails are not part of the legal trail inventory, they may be used and valued by the public who may not be familiar with their status, in fact users likely consider them to be official routes given the length of time that they have been in existence. As such, we ask that prior to any forest management procedures or obliteration, that these routes are analyzed for usage rates by various user groups and that this data is taken into consideration. Specifically we would ask that the highest used routes are adopted into the system, including being assessed for sustainability, and rerouted as necessary. We feel that rerouting these trails with sustainability in mind showcases that mountain bike use on natural surface trails and resource protection can go hand-in-hand. Additionally, once reviewed, if there is a route which was identified as of high value to users, AND if the USFS feel that the alignment may support a system trail, then we would ask that any management procedures (tree thinning operations for example) in these areas account for the trails on the ground, and that the management procedures are implemented to cause minimal damage to these trails.	Road activities are brought forward for restoration objectives and not recreation or travel management. The creation or placement of system roads or trails would be analyzed in a separate project such as a non-motorized trail system, motorized travel management, or other recreation project for roads and trails. However, as part of project design, all previously designated trails and roads will be protected to ensure continued use after restoration activities are completed.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
19	Given that there are already 11.6 miles of system trails in the project area, we would recommend adopting many of the user created routes to expand this system into a ‘stacked loop network’, which is a network of trails extending from and coming back to a central point, with the trails getting progressively more difficult with distance from the trailhead. A network such as this offers mountain biking experiences for a variety of abilities, and can provide safe and sustainable trails for various user groups, including mountain bike riders, hikers, equestrians and trail runners. Again, we would recommend that the trails are analyzed for sustainability during the adoption process and that along with being brought into the official system, they are rerouted as necessary to minimize impacts on the natural resources in the project area. This could significantly address the impacts of excessive sediment loads into the area streams.	See response to comment #18
4). Jay Lininger, Center for Biological Diversity		
20	Forest Roads - We encourage the Forest Service to revise the action alternatives to accurately reflect the transportation specialist’s analysis, which defines the scope of decision space available to the Forest Service under NEPA.	The Forest Service has included a table of road activities and a map of road activities from the transportation specialist’s analysis in the Environmental Assessment and the Draft Decision Notice for the public to better understand the extent

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
21	Forest Roads - The use of temporary roads would be to provide access to treatment areas and minimize skidding distances”). Road density analysis, cited above, does not account for new road construction. Nor does the EA consider road construction among effects to soil and watershed conditions.	The proposed action and alternative 3 did not bring forward new road construction of system roads, however two miles of temporary roads were brought forward to allow for minimized skid distances and better access. Upon further review, the Larson project will not include any temporary roads (the two miles will be removed from the EA and Draft DN in a modified alternative and include no temporary roads) as through analysis there is ample access with favorable skidding potential throughout proposed treatment areas within the project.
22	The Center is likely to object to a proposed decision favoring Alternative 2 because it would remove old growth forest structure when equally effective alternatives exist. A second option proposed in Alternative 3 is to rely on prescribed fire. We discussed reasons why that is not an ideal alternative. A third option is to girdle mistletoe host trees, thereby eliminating the most likely source of infection to a new cohort of regenerated pines after small, infected, understory trees are cleared. The Center has <i>no problem</i> with the second and third options described here. Girdling large trees to kill large mistletoe host trees without removing them by mechanical means is within the decision space afforded by the present analysis because it occurs within the range of extremes defined by mechanical removal, on one extreme, and doing nothing on the other. Another possibility is to do nothing on those 721 acres (Alternative 1), let infected trees die, allow openings to form around them that feature large coarse woody debris, and call it “interspace” (<i>i.e.</i> , permanent grass-forb-shrub).	The district silviculturist mentioned girdling trees but the main suggestions were to leave areas untreated around mistletoe pockets of yellow pines which cannot be adequately treated if large trees are not removed. The suggestion was the use of aggregation pheromones which allow beetles to attack the tree. The use of pheromones would enable a tree to last longer as a snag than girdling. Girdling weakens the tree and often causes them to break at that point where rot can get into the trunk of the tree. Most of the time girdling is ineffective because the cambium is never completely severed leaving the tree alive. Shelterwood/seed cut with reserves treatments are identified in the forest plan as the method of treating mistletoe infected stands. The forest plan states that commercial timber land will be managed to decrease mistletoe. The below is from the forest plan. <u>Insect and Disease Management</u> All silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition to resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate harvests and regeneration harvests.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
23	Northern Goshawk - The EA fails to disclose potentially significant direct, indirect and cumulative effects of the plan amendments to goshawk and prey species whose viability the Forest Service previously stated are assured by implementation of the existing standards and guidelines. It also fails to disclose scientific controversy and uncertainty, unique or unknown risks, and the degree to which the action may be precedent setting.	Implementation of breeding season timing restrictions for activities occurring within goshawk PFAs would eliminate most of the potential for direct effects to goshawks from all of the proposed activities. Existing nest stands have a high canopy cover of mature to old age trees and these conditions would be maintained. Thinning within PFAs is expected to result in a clumpy distribution of all-aged trees which would create more open conditions while still providing sufficient cover to fledgling goshawks and follow canopy coverage guidelines. Small openings would be created within the forested areas to provide more sunlight to the forest floor thereby increasing grasses, forbs, and shrubs. Low severity broadcast fire would result in a mosaic of burned, partially burned, and unburned duff layers. The increase in herbaceous plants and shrubs should result in additional forage and cover for goshawk prey species such as cottontails, golden mantled ground squirrels, and mourning doves.
24	The Center reiterates from prior comment that measuring canopy cover at the tree group level (<1 acre) has the potential to significantly reduce the amount of forest cover within treated areas below what is assumed by prior NEPA analysis underlying the forest plan.	The current Forest Plan is ambiguous with respect to the scale at which canopy cover and VSS are to be measured. The Forest Service decision to use group level data more accurately reflects the distribution of VSS classes for each stand, because multiple VSS groups can be found within a single uneven-aged stand, which does not reflect the stands uneven-aged characteristics. Canopy cover groups in the analysis area may be larger than 1 acre depending on what is naturally occurring on the ground and are not limited to 1 acre.
25	The Forest Service is proposing virtually identical forest plan amendments in every project-level analysis throughout the Southwestern Region. It should account for the cumulative effect of its coordinated, but piecemeal, effort to unravel current management direction for goshawk habitat.	These Forest Plan amendments are necessary because most of the Forests in the Southwest Region lack updated Forest Plans addressing the updated goshawk guidelines of 2007 for defining interspaces. This doesn't change the direction of goshawk management for the Forest Service, nor does it change canopy cover or VSS requirements in the Forest Plan.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
26	Mexican Spotted Owl - Mechanical logging and road use may adversely affect one or more of the primary constituent elements ("PCE") of critical habitat related to forest structure and prey availability.	The district completed consultation with the U.S. Fish and Wildlife Service, with the Service stating, "...short term effects from the proposed actions are insignificant and are not likely to adversely affect the MSO or its critical habitat, and that long-term effects will be beneficial to the owl."
27	Mexican Spotted Owl - Unfortunately, the Forest Service has consistently failed to monitor changes in owl populations and habitat needed for delisting, as required by the forest plan, in violation of NFMA, and contrary to mandatory terms and conditions of the 2012 incidental take statement for MSO regarding forest plan implementation. The agency admits that it has no information about MSO populations in the Apache-Sitgreaves National Forests.	A region-wide population assessment of MSO on Forest systems lands in the southwest has been initiated in 2014. This is not to be confused with protocol monitoring of PACs as are required to be completed prior to implementation of ground disturbing activities. Protocol surveys have begun for the Larson project area, and are scheduled to continue, as needed, throughout the implementation phase of the project. Addressing region-wide changes in MSO population is outside the scope of this project.
28	Mexican Spotted Owl - Both action alternatives in the EA propose to cut up to 16-inch diameter trees in PAC, outside of 100-acre nest core areas. The Forest Service asserts that the new recovery plan supports this approach. However, the revised recovery plan itself calls for "minimal" mechanical treatments in PAC, and recommends a "diversity of tree sizes ... with a goal of having trees ≥ 16 " DBH contributing $\geq 50\%$ of stand basal area in PAC."	Refer to Agency Response 26
29	Mexican Spotted Owl - The revised recovery plan does not supply the Forest Service license to cut any tree up to 16-inches diameter in PAC, as proposed in the EA.	Refer to Agency Response 26

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
30	Mexican Spotted Owl - Given the likelihood that the Larson project will be implemented without observance of current standards and guidelines in the forest plan, which supply the basis for prior no-jeopardy opinions regarding effects of MSO habitat management, it is likely that the project will adversely affect the MSO and/or critical habitat, and will incidentally take individuals of the species, requiring a specific exemption from the prohibition on take in Section 9 of the Endangered Species Act.	Refer to Agency Response 26

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
Objection). Jay Lininger, Center for Biological Diversity		
31	The EA fails to quantify or locate existing old growth habitat meeting Forest Plan standards. It merely describes the extent of “allocated old growth” or “developing old growth,” and fails to describe the <i>actual</i> condition of old growth habitat or the effect of “shelterwood/seed cut” prescriptions. The phrase, “developing old growth,” does not occur in the Forest Plan, and the EA does not define it. Where old growth forest is deficient relative to plan standards, no further removal of it is permissible under NFMA [Objection, p.	The Apache-Sitgreaves National Forests Plan (USDA 1987, as amended 2009, page 98) establishes forest-wide Standards for managing old growth forest structure: “Until the forest plan is revised allocate no less than 20% of each forested ecosystem management area to old growth as depicted in the following table (page 100) [meeting criteria of dbh, trees/acre and age by vegetation type and site index]. In the long term, manage old growth in patterns that provide for a flow of functions and interactions at multiple scales across the landscape through time. Allocations will consist of landscape percentages meeting old growth conditions and not specific areas.” The Apache-Sitgreaves National Forests Plan (USDA 1987, as amended 2009, page 98) also establishes forest-wide Guidelines for managing old growth forest structure: “All analyses should be at multiple scales – one scale above and one scale below the ecosystem management areas. The amount of old growth that can be provided and maintained will be evaluated at the ecosystem management area level and be based on forest type, site capability, and disturbance regimes. Strive to create or sustain as much old growth compositional, structural, and functional flow as possible over time at multiple area scales. Seek to develop or retain old growth function on at least 20% of the naturally forested area by forest type in any landscape. Use information about pre-European settlement conditions at the appropriate scales when considering the importance of various factors. In allocating old growth and making decisions about old growth management, use appropriate information about the relative risks to sustaining old growth function at the appropriate scales, due to natural and human-caused events. Use quantitative models at the appropriate scales when considering the importance of various factors. These models may include, but are not limited to: Forest Vegetation Simulator, BEHAVE, and FARSITE.” The project does not identify specific areas that currently meet old growth plan standards separately from areas proposed to be managed to create or develop towards these conditions, nor is this required. The plan clearly directs that allocation of old growth at the ecosystem management scale may include areas where forest conditions currently meet the standards (sustain existing old growth), and also may include areas where desired conditions may be created over time. The project allocation (locations displayed on project record maps) is based upon selected stands with current conditions that can most rapidly achieve desired characteristics, although this selection criterion is not a Forest Plan requirement. The proposed treatment prescriptions found in the project record silviculture specialist report appendices (2014.08.13) describe management practices consistent with managing for the target old growth conditions over time. The proposed shelterwood seed-cut with reserves treatments are not included within the areas currently allocated to be managed for old growth forest conditions, and therefore are not relevant to the topic of old growth management emphasis areas. Additionally, under alternative 3 (as modified) all large trees will be managed based on the project “Large Tree Implementation Plan”, and all trees greater than 24”+DBH will be reserved from removal in Mexican spotted owl (MSO) forest habitat throughout the project area, including within the shelterwood seed-cut with reserves areas.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
32	The draft decision misleadingly states that “VSS class 5 and 6 could only be removed according to the Large Tree Retention Strategy.” The Strategy is not included in the proposed decision or in the Final EA. The shelterwood/seed cut prescription contemplated in Alternative 3 Modified is not consistent with the stakeholder-created strategy [Objection, p. 5].	The decision will direct treatments towards developing uneven-aged forest structure, except for the areas to be managed for old growth, MSO PACs, and goshawk nesting locations. The focus elsewhere will be to develop or maintain forest stands at densities within the historic range of variability, based upon the project purpose and need and desired conditions. This will include managing each stand towards a balance of young, mid-aged, and old forest structure, similar to historic conditions. Since some stands lack adequate representation of old trees, few to none of these will be cut in most cases. VSS 5 and 6 trees would only be removed to achieve or develop desired conditions, based on the project “Large Tree Implementation Plan.”
33	Alternative 3 Modified (and Alternative 2 in the EA) would violate the old growth standards and guidelines by failing to demonstrate that 20 percent of each ecosystem management area is allocated to old growth, as defined by the Forest Plan; by failing to disclose an analysis of impacts to old growth at multiple scales, including one scale above and one scale below ecosystem management areas; by failing to develop and retain old-growth function on at least 20 percent of the naturally forested area by forest type; and by proposing to log thousands of old growth trees despite noncompliance with old growth habitat requirements.	This project has identified 47% of mixed species stands, 32% of aspen stands, and 24% of ponderosa pine stands in this ecosystem management area (acres by forest type basis) to be managed to create or sustain the Forest Plan Standards for old growth forest conditions over time. This project has also analyzed the distribution of old growth at three scales as required by Forest Plan Guidelines. The three scales analyzed are: stand-level scale, ecosystem management scale (project), and the Ranger District scale.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
34	Lost recruitment of old growth due to removal of existing large trees and coarse woody structure presents a potentially significant cumulative effect to the environment, which the EA fails to disclose, in violation of NEPA [Objection, p. 5].	Alternative 3 (as modified) is fully consistent with the Forest plan for allocation of areas to be managed to create old growth forest structure over time. The areas proposed for old growth forest emphasis would be managed as described in the proposed treatment descriptions to develop, create, or sustain old growth conditions according to Forest Plan Standards. Throughout the remainder of the project area, most stands will be managed towards desired uneven-aged forest conditions, based on Forest Plan northern goshawk and Mexican spotted owl habitat management Standards and Guidelines. The proposed management trajectory for uneven-aged conditions will develop (over time) and/or maintain young, mid-aged, and old tree components in each stand with proportions similar to historic conditions (as informed by current best science). Additionally, the project will reserve all VSS 6 trees (24"+DBH) from removal throughout all Mexican spotted owl forest habitats. Managing to promote even-aged old growth stands is not desired except in old growth emphasis areas, Mexican spotted owl protected areas, and goshawk nest locations and doing this would be in violation of plan direction to manage to create or maintain uneven-aged forest conditions.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
35	The draft decision for the Larson project would amend the Forest Plan following the concepts described in the “Implementation Guide, Region 3, Northern Goshawk Standards and Guidelines” (USDA 2007). The plan amendment is a significant shift from the Forest Plan (USDA 1996) and the intensity of its effect to the environment, including northern goshawk and its 14 prey species, will be greater than what the Forest Service disclosed in prior NEPA analysis (USDA 1995, 2006). The Forest Plan (USDA 1996) and its underlying NEPA analysis (USDA 1995, 2006) provide for the viability of goshawk and its prey species with an assumption that approximately 20 percent of ponderosa pine forests will be in relatively open condition, including 10 percent as VSS 1 and 10 percent as VSS 2. The Forest Service further stated in NEPA analysis that intermixing of VSS classes in this way will maintain viable populations of northern goshawk and its prey. In contrast, the proposed decision for the Larson project has an entirely different approach to managing goshawk habitat by introducing “interspace,” and by counting it separately from the VSS stages, and by exempting it from canopy cover guidelines. The proposed Forest Plan Amendment #1 in the draft decision for the Larson project will fall short of canopy cover requirements established by the Forest Plan (USDA 1996), and may significantly affect sensitive species at an intensity that exceeds what was analyzed and disclosed prior environmental analysis (USDA 1995, 2006) [Objection, pp. 6-9].	The purpose and need for this project is to restore degraded ecosystem functions, resilience, and sustainability to frequent-fire forests in the project area. These actions include restoration and maintenance of habitats for native species, and protection of these habitats from uncharacteristic disturbances such as epidemic and outbreak levels of insects/diseases and high-severity wildfires. The Forest Plan is being amended for this project to facilitate project implementation consistent with current best science related to the ecology of these frequent-fire forests, and associated wildlife habitats. The need for plan amendment was informed by current peer-reviewed science that demonstrates a framework for restoring forest ecosystem resiliency. This science addresses wildlife habitat sustainability, including northern goshawk habitats in restored forests (Reynolds and others, 2013, USDA, Forest Service, General Technical Report RMRS-GTR-310).

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
37	The Forest Service admits in the EA that the plan amendment will not implement the goshawk guidelines as they are currently written. It will: (1) introduce “interspace” outside of the VSS classes; (2) allow removal of VSS 6 groups where they are currently deficient; and (3) retain canopy cover only in small (<1 acre) tree groups. The plan amendment is “significant,” within the meaning of that term under the NFMA planning directives, because it would implement at a site-specific level a broad policy shift that is currently underway throughout the Southwestern Region for management of goshawk habitat. The EA failed to support a finding that the plan amendment is “non-significant” [Objection, p. 10]	Alternative 3 (as modified) will reserve all VSS 6 trees (24”+DBH) from removal throughout all MSO forest habitats within the project area. Elsewhere in the project area, VSS 5 and 6 trees would only be removed to achieve or develop desired conditions, based on the project “Large Tree Implementation Plan.” The Forest Plan will be amended to clarify forest canopy cover management objectives within the project area, consistent with meeting project purpose and need. The appropriate Forest Plan amendments to implement this project and rationales are included in this decision. The project area (site-specific) plan amendment affects local habitats in a defined area, and does not affect resources at the forest-wide scale. Therefore the effects of implementing this project are not significant at the Forest-wide plan level.
38	The Forest Service should account in the environmental analysis for cumulative effects of its coordinated but piecemeal efforts to unravel current management direction for northern goshawk habitat. The Forest Service is required by NFMA and NEPA to take a hard look at the overall cumulative effect of these numerous plan amendments on the viability of sensitive species and their prey. To meet NFMA, it should follow procedures required for developing and approving forest plans. The Forest Service has not addressed goshawk or prey species viability, or controversy, uncertainty, risk or precedent [Objection, p. 11].	This comment relates to Region-wide management of goshawk habitat, and is therefore outside the scope of the Larson Forest Restoration project. Best available science was used in preparing the environmental analysis (RMRS-GTR-310) for the Larson project, in addition to obtaining site-specific historical reference conditions and local ecological site characteristics to better inform restoration parameters. Goshawk and prey species viability has been addressed in the wildlife specialist report for the Larson project.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
39	Given the lack of timely protocol surveys for MSO adjacent to the project area, the environmental analysis must assume that the habitat is occupied, that the project may affect more than the MSO PACs considered in the EA, and that incidental take may result from project activities. The EA fails to consider significant effects to MSO that may result from proposed forest treatments in suitable habitat that may be occupied, including potential take [Objection, pp. 12-18].	The wildlife specialist report within Table 13 shows the monitoring history that has been done for the PACs which makes up 63% of the MSO habitat within the project area. There is an additional 1,220 acres of MSO recovery habitat outside of PACs which include 564 acres of nest/roost replacement habitat and 656 foraging habitat. Surveys will be completed specific for this project before implemented. The Fish and Wildlife Service (FWS) concurred with the forest that the project as proposed would not have an adverse effect to the MSO. If the project plans change, or if information on the distribution or abundance of listed species or critical habitat becomes available, the forest will need to reconsult with the FWS. Therefore the forest does not need to assume habitat outside of PACs is occupied.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
40	The Forest Service has consistently failed to monitor changes in owl populations and habitat needed for delisting, as required by the Forest Plan, in violation of NFMA. Forest Service compliance with terms and conditions of the April 30, 2012 FWS biological opinion and incidental take statement for the Apache-Sitgreaves National Forests will not avoid jeopardy to Mexican spotted owl or adverse modification of critical habitat because the conservation status of the species and the effect of ongoing forest management throughout its range, including the instant proposed action, is unknown. In addition, compliance with terms and conditions of the biological opinion and incidental take statement will not meet the independent obligation of the Forest Service under the NFMA to monitor changes in owl populations and habitat, as required by the Forest Plan [Objection, pp. 18-20].	The Larson project will not have an adverse effect to the MSO or its critical habitat for any of the action alternatives . The FWS concurred with this determination and no incidental take was issued for this project. Therefore this project would not affect the jeopardy to the MSO or an adverse modification to critical habitat. Both action alternatives would result in a small increase in habitat quantity and quality for the MSO. This increase in habitat is not expected to contribute to Forest-wide habitat and population trends. As noted in the response to comment, “A region-wide population assessment of MSO on Forest systems lands in the southwest has been initiated in 2014. This is not to be confused with protocol monitoring of PACs as are required to be completed prior to implementation of ground disturbing activities. Protocol surveys have begun for the Larson project area, and are scheduled to continue, as needed, throughout the implementation phase of the project. Addressing region-wide changes in MSO population is outside the scope of this project.”
41	The draft decision violates NEPA because the proposal to conduct mechanical forest treatments in PACs that “may affect” MSO while failing to monitor treatment effects, contrary to FWS recommendations is controversial [Objection, p. 20].	The FWS in their letter of concurrence [PR 127 p. 2] notes that all mechanical thinning and low severity burning in MSO habitats will follow the Mexican Spotted Owl Recovery Plan, first revision (USFWS 2012) guidelines. The EA show the amendment language for the forest plan for monitoring for activities in the PACs “In protected areas where silvicultural or fire abatement treatments are planned, monitor treated stands pre- and post-treatments to determine changes and trajectories in fuel levels; snag basal areas; live tree basal areas; volume of down logs over 12 inches in diameter; and basal area of hardwood trees over 10 inches in diameter at the root crown.”

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
42	The draft decision violates NEPA because the EA fails to disclose whether the action is related to other actions with individually insignificant but cumulatively significant impacts. In this case, the Forest Service simultaneously proposes to conduct mechanical treatments in many other PACs, including the adjacent Rim Lakes project, the 4FRI project and the Flagstaff Watershed Protection Project, all within the same EMU. No information in the record shows that the Forest Service considered significant cumulative effects that may result from mechanical treatments in PACs [Objection, p. 20].	The cumulative effects analysis geographic boundary is the boundary of the proposed action plus a one half mile buffer therefore, 4FRI phase 1 and FWPP is outside the CE analysis area. Endangered Species Act requirement for cumulative effects is not the same as NEPA requirements. Cumulative effects for are those effects of future State, tribal, local or private actions, not involving Federal Activities, that are reasonably certain to occur in the action area of the Federal action subject to consultation. [50 CFR §402.02]. For other federal projects already consulted on within the EMU, the FWS will used the consultation done for those project to help set the baseline for the MSO. This information was used by the Fish and Wildlife Service to determine cumulatively if a jeopardy determination would occur from the proposed action. A jeopardy or non-jeopardy determination would normally only occur within a Biological Opinion. Since this project was determined to not have an adverse effect to the any federally listed species no Biological Opinion was issued, instead, a letter of concurrence was issued to the forest to show that the Fish and Wildlife Service had concurred with the determination of may affect not likely to adversely affect the MSO.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
43	The draft decision violates NEPA because the EA fails to disclose the degree to which the action “may adversely affect an endangered or threatened species or its habitat that has been determined to be critical.” In this case, MSO critical habitat exists in the project area and the Forest Service proposes mechanical logging that may affect primary constituent elements (PCE) of critical habitat. The Forest Service admits that ground disturbance would negatively affect forest soils. But it does not give any attention to effects of ground disturbance on PCE that result from opening Level 1 roads or deployment of logging equipment. Additionally, the Larson project would retain just 60-80 ft²/acre of basal area (“BA”) in MSO critical habitat. Past timber harvest caused significant decline of large tree density in the project area and throughout the range of Mexican spotted owl. Degradation of the large tree PCE in critical habitat may be cumulatively significant [Objection, pp. 21-22].	The Larson project will not have an adverse effect to the MSO or its critical habitat for any of the action alternatives . The FWS concurred with this determination [PR 121] and no incidental take was issued for this project. Therefore this project would not affect the jeopardy to the MSO or an adverse modification to critical habitat. The letter of concurrence also states that the short-term effects from the proposed actions are insignificant and are not likely to adversely affect the MSO or its critical habitat, and that long-term effects will be beneficial to the MSO. PCEs for the MSO do not set a desired basal area level throughout the critical habitat. However, the Larson project would retain a much wider range of basal area depending on the location of treatment. The BA also states that treatments (mechanical and broadcast burning) are expected to have a short-term, non- significant impact to the primary constituent elements of critical habitat (for both Forest Structure and Prey Base) with a long-term benefit.

COMMENT NUMBER	COMMENT	AGENCY RESPONSE
44	The Forest Service has failed to consider foreseeable cumulative effects to MSO viability and recovery from post-fire management activities that it has authorized in critical habitat [Objection, pp. 22-23].	Cumulative effects analysis deals with past present and reasonably foreseeable actions which might have an impact on the human environment. Agencies are directed to consider potential cumulative impacts but to also “bound” the consideration in time and space. Snags and logs would be retained at or managed towards meeting Forest Plan guidelines. Current snag densities are below Forest Plan standards of 2-3 per acre. Current log densities fall within the Forest Plan standard of 3-5 per acre. Aerial detection surveys in 2002 showed there were large areas of active complexes of insect outbreaks across the District (including Larson), and may over time reduce the large live tree component in the mixed conifer forest type, creating future snags and large down logs at or beyond Forest Plan guidelines.