United States Department of Agriculture
Forest Service

Southwestern Region

Decision Notice

Larson Forest Restoration Project

Apache-Sitgreaves National Forest
Black Mesa Ranger District

Coconino and Navajo Counties, Arizona

Printed on recycled paper – July 2015

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

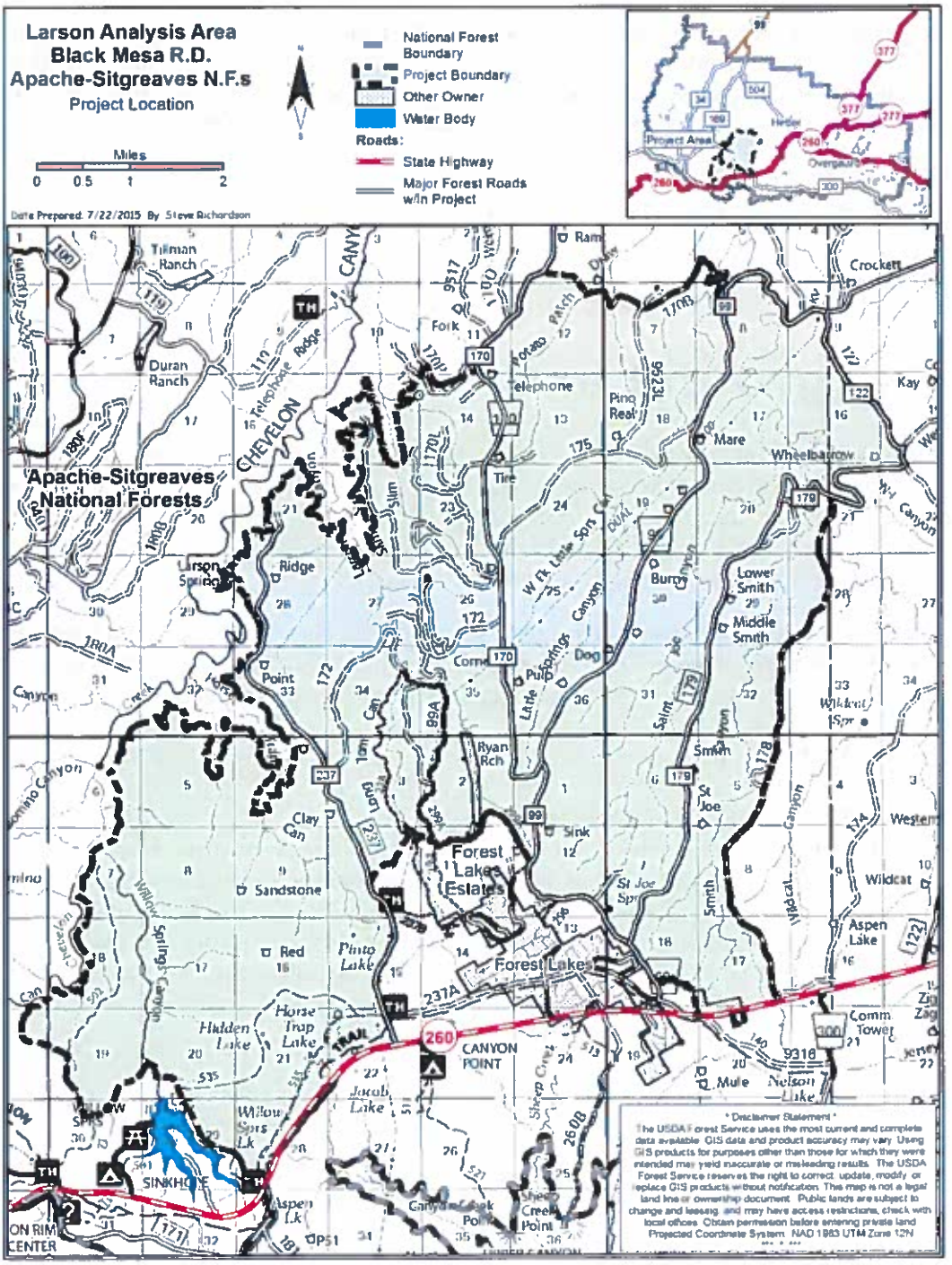
Background and Need

The Black Mesa Ranger District of the Sitgreaves National Forest has analyzed the effects of restoration activities within the Larson project area. Project activities implementing restoration activities are within the vicinity of Forest Lakes, Arizona. As required by the National Environmental Policy Act (NEPA), an Environmental Assessment (EA) was prepared disclosing the expected environmental impacts of a proposed action.

There is a need to apply appropriate restoration activities to meet the Purpose and Need to:

- **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 to 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 for public transportation and minimizes sediment delivery to streams.

Map 1 – Larson Project Location



Alternatives Considered in Detail

Alternative 1 – No Action

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

Alternative 2 – Proposed Action

Alternative 2 was developed to address the purpose and need of the project to address forest restoration. All activities proposed are listed on pages 14 - 24 of the EA.

Alternative 3

Alternative 3 was developed to address the purpose and need of the project to address forest restoration as well as addressing public concerns for the retention of large trees across the project area. All activities proposed are listed on pages 12 – 20 of the Draft EA and pages 23 and 24 of the EA.

Alternative 3-Modified from the first EA

Alternative 3-Modified from the first EA was developed to address the purpose and need of the project to address forest restoration, address public concerns for the retention of large trees across the landscape, to allow for treatment in shelterwood/seed cut areas proposed in alternative 2, and to address changes in treatment areas based on new information from field surveys for Mexican spotted owl. All activities are listed on pages 14 – 24 of the EA and this Decision Notice.

Alternative 3-Modified

Alternative 3-Modified was developed to address the purpose and need of the project to address forest restoration, address public concerns for the retention of large trees across the landscape, to allow for treatment in shelterwood/seed cut areas proposed in alternative 2 with other means besides cutting, and to address changes in treatment areas based on new information from field surveys for Mexican spotted owl. All activities are listed on pages 14 – 24 of the EA and this Decision Notice.

Decision

After a thorough review of the effects analysis completed in the EA and consideration of public input through the objection process, I have decided to implement Alternative 2 with modification with the project design features, best management practices, and monitoring requirements listed in Appendix B and C of this document. These features were prescribed by the interdisciplinary team of resource specialists and were based on consideration and evaluation of site-specific conditions within the project area. The effectiveness of these measures in keeping resource impacts to a minimum is based on professional and agency experience and monitoring of projects similar to the Larson Forest Restoration Project. Maps included with this decision are in Appendix D of this document.

The only modification to Alternative 2 is that no temporary roads will be authorized as compared to 2 miles in the EA.

Alternative 2 with modification– Selected Action

- 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 reserves[1] - 721 acres
            - This will 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 exclosure 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.
- Roads Activities
    - Open approximately 156 miles of existing closed roads to be used for treatment activities. Close and rehabilitate roads when treatments are completed.

[1] Reserve trees will be overstory trees uninfested with dwarf mistletoe.

- No temporary roads will be authorized.
- Decommission approximately 7.5 miles of closed (maintenance level one) roads.
- Obliterate and rehabilitate approximately 45 miles of unauthorized routes in the project area.

Table 1. Roads Decommissioning and Obliteration Activities

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

- 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. See Appendix A for the entire Forest Plan Amendment.

Old and Large Tree Implementation

Appendix E of this DN describes the Old Tree Implementation Plan that will be utilized to determine instances where large or old trees (VSS 5 and 6) will be removed. Instances where these trees may be removed are described in detail in appendix E, but will 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 the Selected Action, removal of large/old trees that meet the criteria set forth in the large/old tree implementation plan will be through mechanical treatments.

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 comment period was published in the White Mountain Independent on August 26, 2014. A total of 4 comment letters were received as well as one objection response to the first EA. Notice objection eligibility will be made to those who provided comment during official comment opportunities for this project.

Response to Comments provided in Draft EA

Please see Appendix D of the EA 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 were responded to with the creation of Alternative 3-Modified.

Response to Objections to the first EA and Draft DN

Please see Appendix D of the EA 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 were responded to with the creation of Alternative 3-Modified.

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.

Forest Plan Consistency

This decision is consistent with the 1987 Apache-Sitgreaves National Forests Land and Resource Management Plan (Forest Plan), as amended. Plan amendments included in this decision are in compliance with the 1982 Planning Rule. The authority for using the 1982 planning rule is found in the 2012 planning rule transition language: 36 CFR 219.17(b)(2). Forest Plan amendments are in conformance with the now final Planning Directives. FSH 1920, and are found to be non-significant using section 26.51 factors for amendments using the 1982 rule. The following non-significance factors apply to this decision:

1. Actions that do not significantly alter the multiple-use goals and objectives for long-term land and resource management.
4. Opportunities for additional projects or activities that will contribute to achievement of the management prescription.

Administrative Review

The analysis for this Decision Notice was completed under the authority of the Objection Process (36 CFR 218) for Non-Healthy Forest Restoration Projects. The regulation specifies that a "Special Administrative Review Process" be established for authorized projects and that pre-decisional review be utilized contained in 36 CFR 218 parts A and B.

The Larson Forest Restoration project was made available to the public on April 24, 2015 with a letter with those who had standing to object on the project. On April 28, 2015, the legal notice for the objection period was posted in the White Mountain Independent. In this notice, the public was notified that a decision based on the EA was made following the pre-decisional objection process, pursuant to Forest Service regulations at 36 CFR 218. One formal objection was filed. This objection was resolved with no changes from the Draft DN brought forward. An official response to the objector was completed by the Reviewing Officer, Jim Upchurch, Deputy Regional Forester.

Appeal Opportunities

This decision is not subject to appeal in accordance with Title 36, CFR, Part 215.12(i).

Implementation Date

Implementation of activities under the selected action will occur based on this Decision Notice. Once this decision is signed, implementation of the Larson Forest Restoration project can begin immediately pursuant to regulations at 36 CFR 218.

Contact

For additional information concerning this decision, contact: Cody Hutchinson, Interdisciplinary Team Leader, Apache-Sitgreaves National Forests, PO Box 640, Springerville, AZ 85938, (928) 333-6333, or crhutchinson@fs.fed.us.

Thomas D. Osen
Forest Supervisor
Responsible Official
Apache-Sitgreaves National Forests

08/13/2015
DATE

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**
Guidelines	
Vegetation Management	
Landscapes Outside Goshawk Post-Fledgling Family Areas	
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	**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

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 a guide and actual percentages are expected to vary + or – up to 3 percent.	(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 percentages are a guide and actual percentages are expected to vary plus or minus up to 3 percent.
Landscapes Outside Goshawk Post-Fledgling Family Areas	
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)	No change.

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. 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 then 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 then 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.
Landscapes Inside Goshawk Post-Fledgling Family Areas	
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, St. Joe, 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.	Mixed conifer: 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. Pine-oak: 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

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 run-off 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 will 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. Protect key habitat elements including large trees, snags, down logs, and hardwoods.
- No thinning will occur within the 100-acre core areas of MSO PACs.
- Broadcast burning in MSO recovery and protected habitat will 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) will 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, dendrogylphs (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.

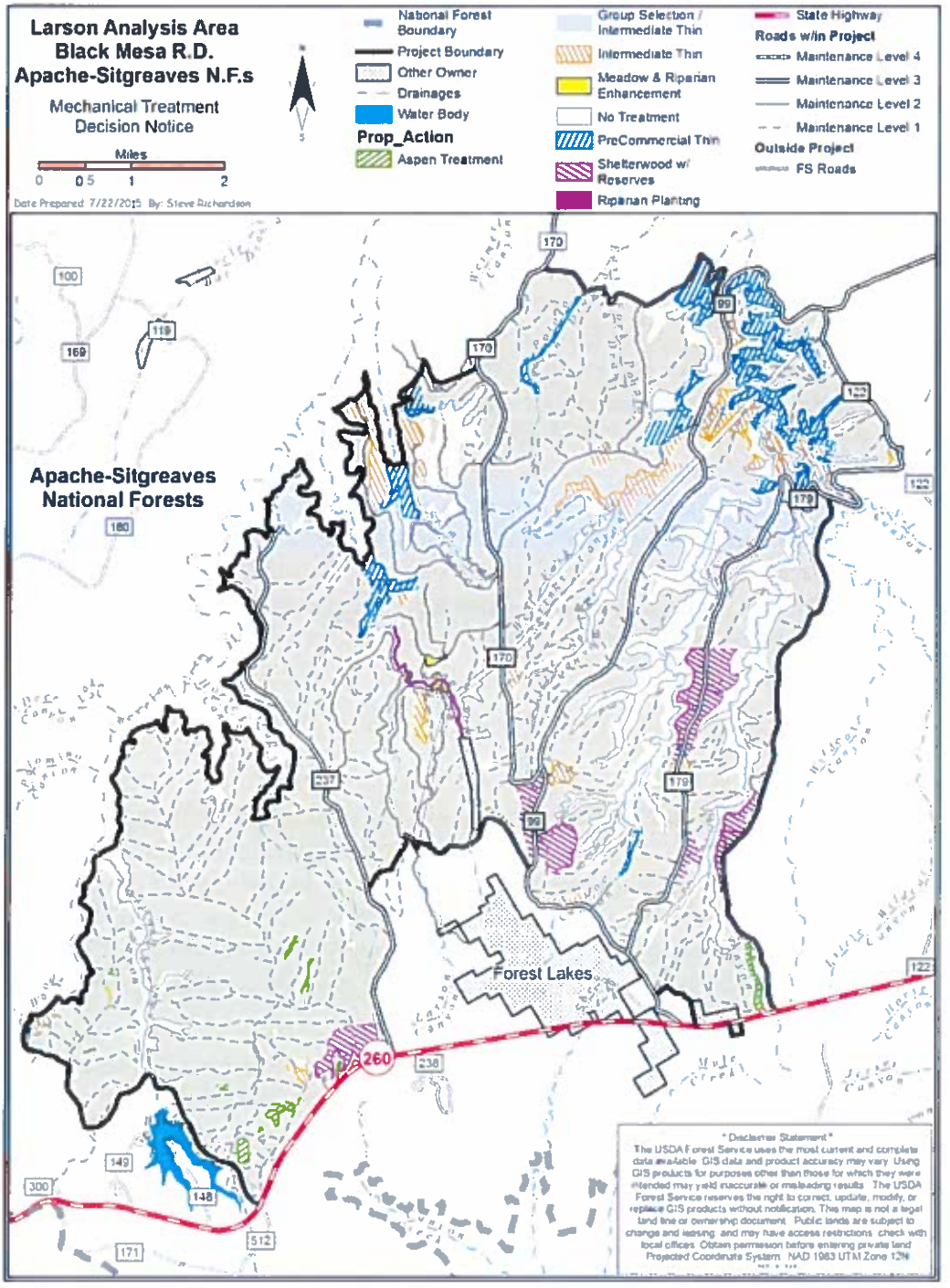
B. Soil Disturbance Monitoring

   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.

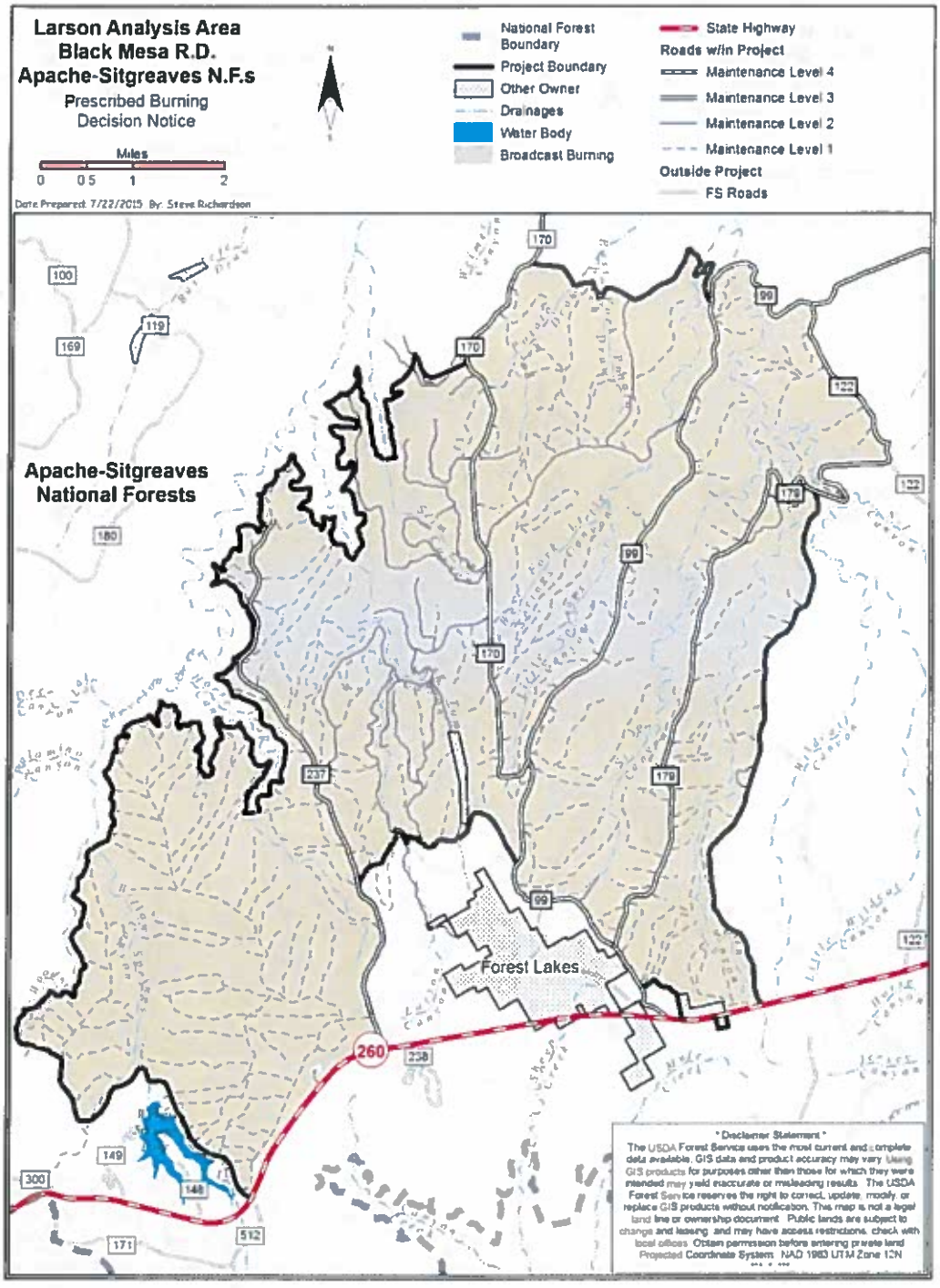
   The desired result of Soil Disturbance Monitoring is to determine if forest practices may be reducing long term soil productivity through modification of soil function through compaction, displacement or loss of soils.

Appendix D – Maps

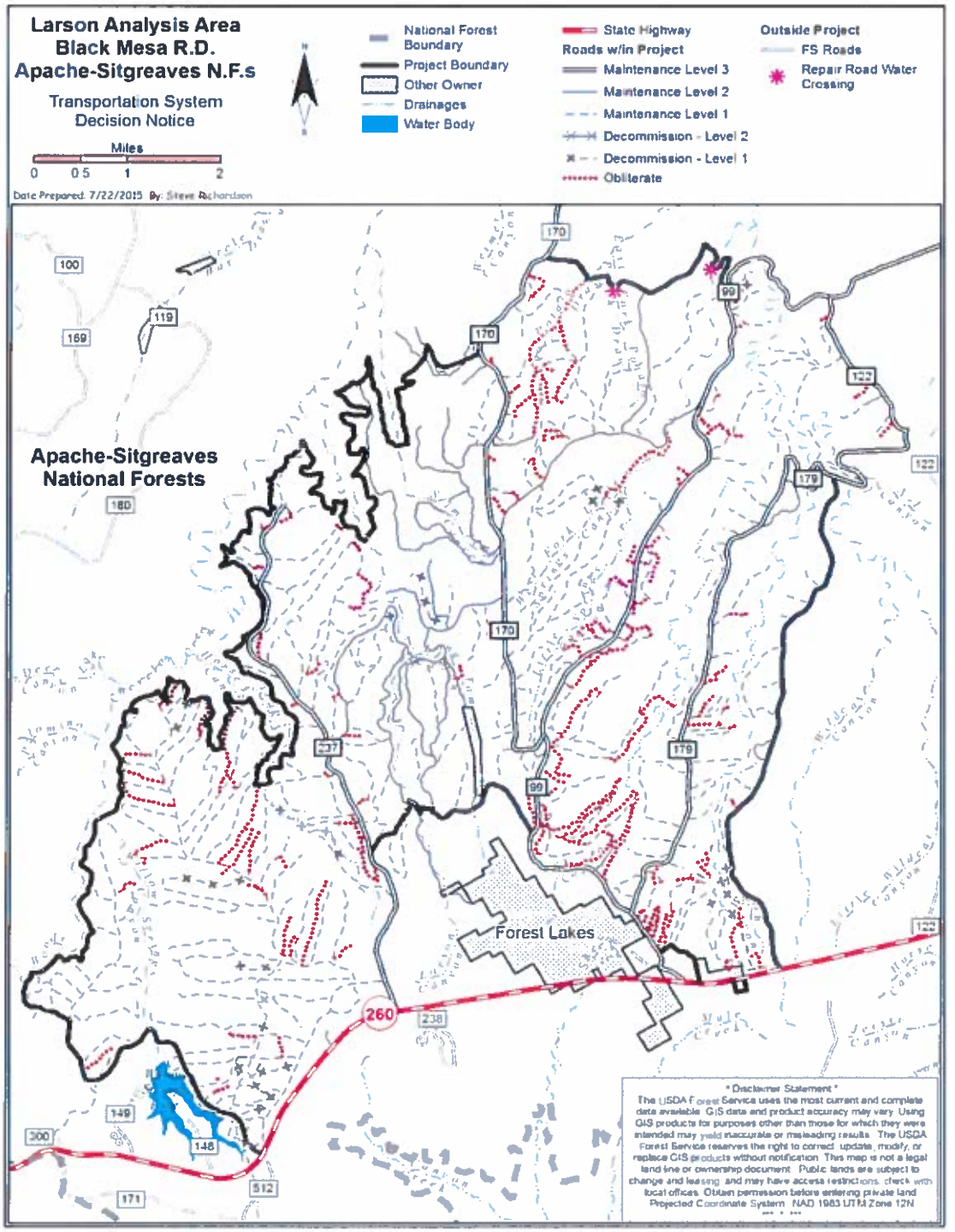
Map 2 – Mechanical Treatments



Map 3 – Prescribed Burning



Map 4 – Transportation System and Roads Activities



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 will 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 will correspondingly have a balance (by area occupied, not trees per acre) of small, medium and large-sized trees. Also these trees will 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) will be retained, with few exceptions, regardless of their diameter, within the Larson project area. Removal of old trees will be rare. Exceptions will be made for threats to human health and safety. Old trees will 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 will 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 will result in less habitat degradation then relocating a road.

Old trees will 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 1 and Figure 2 display illustrations of size class 3 (intermediate-mature) and size class 4 (mature-overmature) from Thomson 1940.

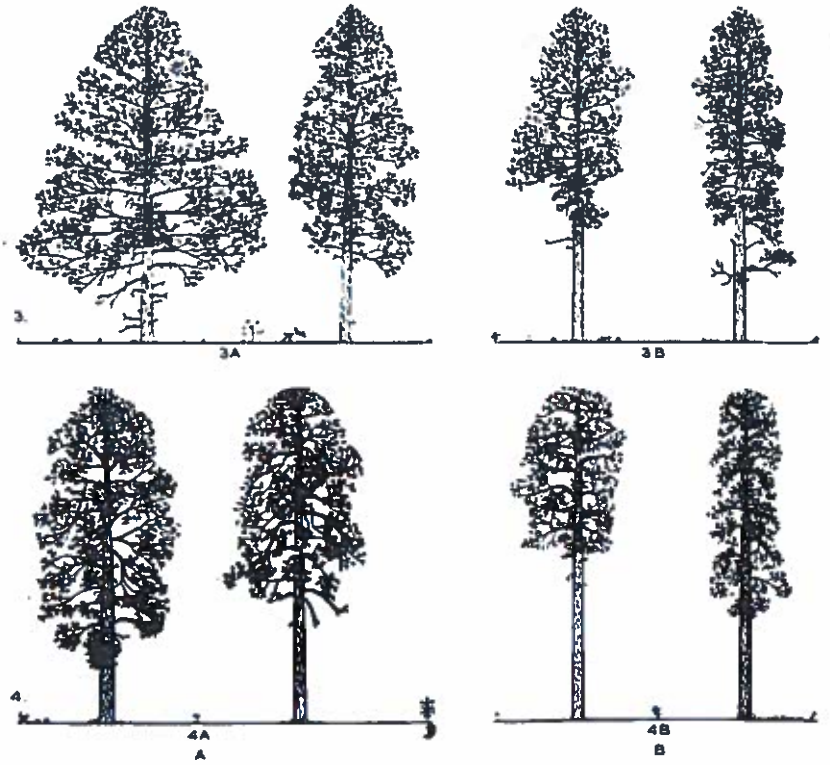


Figure 1. Old tree characteristics (Thomson 1940)

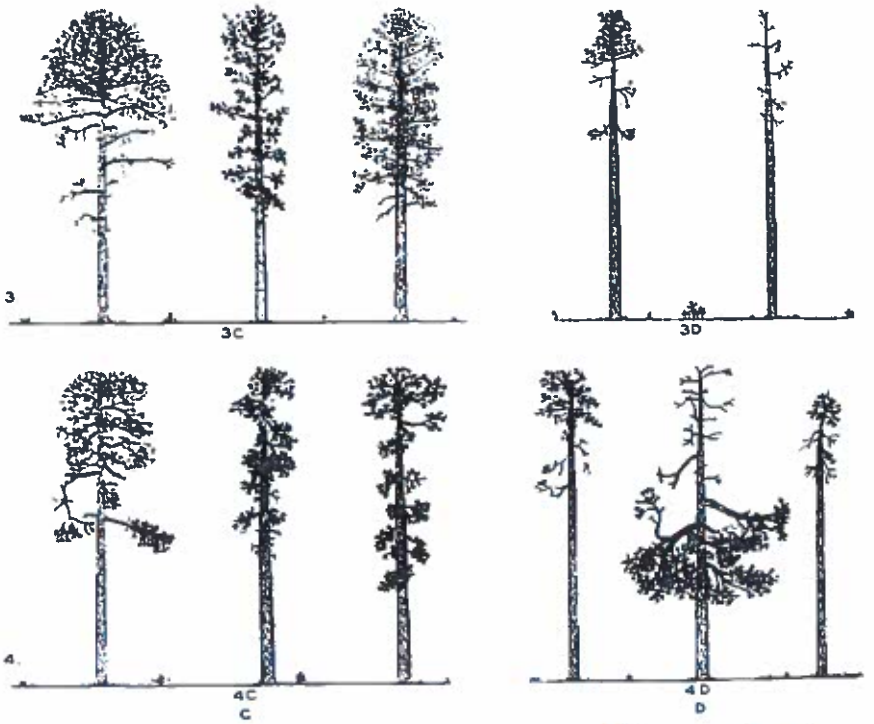


Figure 2. Old age tree characteristics continued (Thomson 1940)

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 will 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 the meet the desired conditions included in this strategy, no large trees will be cut until the NEPA decision is reviewed by the Forest Service implementation team. The team will decide whether the action is consistent with the analysis and the decision made. This information will 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 will 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) will be managed for greater residual canopy cover and density of large trees. Residual stand structure will be managed at the upper end of natural range of variability for ponderosa pine stands that meet these conditions. This will 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 will range in size from 4 acres to 1/10th acre in ponderosa pine and mixed conifer stands. Openings will 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) will be managed for greater residual canopy cover and density of large trees. Residual stand structure will be managed at the upper end of natural range of variability for ponderosa pine stands that meet these conditions. This will 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 will 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 will apply when other options will 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 will 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 will have occurred pre-settlement, only a few large pines may need to be removed. Many of these areas will 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) will be managed for greater residual canopy cover and density of large trees. Residual stand structure will be managed at the upper end of natural range of variability for ponderosa

pine stands that meet these conditions. This will 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.

Areas with 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 will 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 dwarf mistletoe free stand 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.